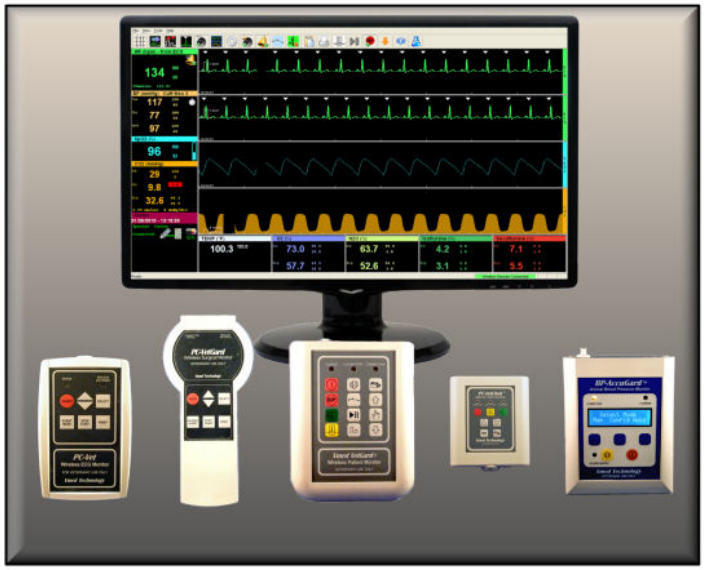
Vmed Technology

PC-Display Wireless Monitoring Software



For all Vmed Wireless Monitors

Installation, Setup and User Instructions Version 2.5

Table of Contents

Table of Contents 1
Chapter 1 Installation and Setup 3
Installing the PC-Display Application software 3
Computer Video Resolution 7
Installing Bluetooth 7
Bluetooth Installation and Discovery, Windows XP Service Pack 2 or 3 8
Bluetooth Installation and Discovery, Windows 7 and Vista (SP2) 11
Bluetooth Installation and Discovery, Windows 8.1 15
Configuring PC-Display for Internal Bluetooth 17
Setting PC-Display Defaults 20
Customization of the Patient Information List 37
Interfacing With Practice Management Software 39
Setup Vet/Clinic Information (USA and Canada) 40
Setup Vet/Clinic Information (International) 41
Using Your Clinic Logo on Printed Reports 42
Chapter 2 Description of Monitors 46
BP-AccuGard™ Blood Pressure Monitor 46
PC-VetChek ECG Screening and Recovery Monitor 49
PC-VetGard+ Wireless Surgical Monitor 52
Chapter 3 Operating Instructions 55
Software 55
Wireless Connection 56
Setup Patient Information 59
Sweep and Scale 60
Toolbar Buttons and Functions 60
Alarms and Sounds 63
Recording Monitoring Information 65
Printing 66
PC-Display Keyboard Shortcuts 69
Chapter 4 Reviewer Program 71
Description 71
Modes of Monitor Recording 71
Using the Reviewer Program 72
Reviewer Toolbar 75
Reviewer Configuration 76
Printing 78
Help Menu 81
Chapter 5 Support and Troubleshooting 84
Service and Support 84

Troubleshooting PC-Display 85
Appendix A Computer Requirements and Specifications..... 86
Appendix B Software License..... 87
Appendix C Discontinued Monitors..... 89

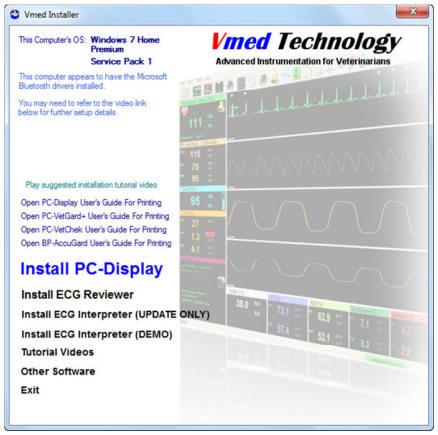
Chapter 1

Chapter 1 Installation and Setup

NOTE: This printed manual covers Bluetooth installation on Windows 7, Vista and Windows XP with Service Pack 2 or 3 (SP2 or SP3) computers only. Refer to the manuals included on the Vmed Installation CD or to the included installation tutorial videos to setup Bluetooth with anything other than the Microsoft Windows Bluetooth drivers.

Installing the PC-Display Application software

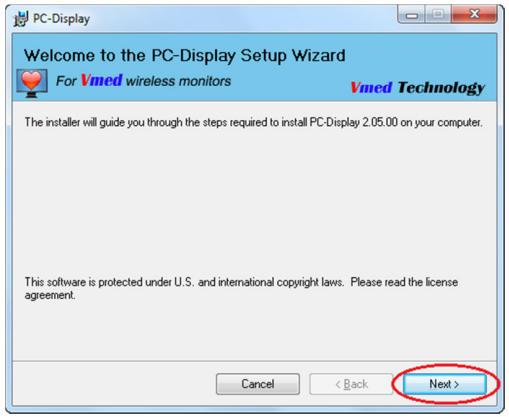
1. Put the Vmed Software Installation CD into the computer's CD-ROM drive. The installation program should automatically start and the window below will appear:


Vmed Installer
This Computer's OS: Windows 7 Home Premium Service Pack 1
Vmed Technology
Advanced Instrumentation for Veterinarians
This computer appears to have the Microsoft Bluetooth drivers installed.
You may need to refer to the video link below for further setup details.
Play suggested installation tutorial video
Open PC-Display User's Guide For Printing
Open PC-VetGard+ User's Guide For Printing
Open PC-VetChek User's Guide For Printing
Open BP-AccuGard User's Guide For Printing
Install PC-Display
Install ECG Reviewer
Install ECG Interpreter (UPDATE ONLY)
Install ECG Interpreter (DEMO)
Tutorial Videos
Other Software
Exit

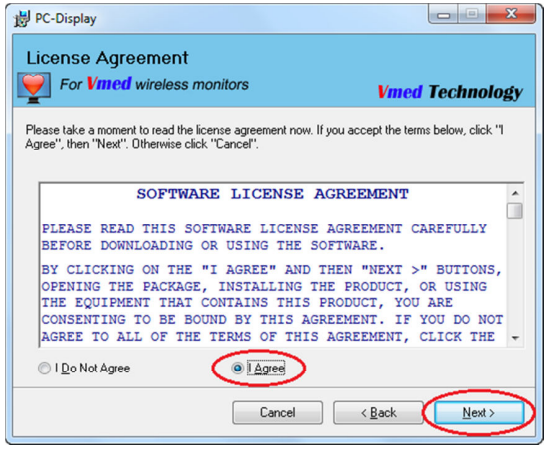
NOTE: You may at first wish to click the "Play suggested installation

tutorial video" text in order to view a tutorial video of how to install Bluetooth and discover your Vmed wireless device on your computer.

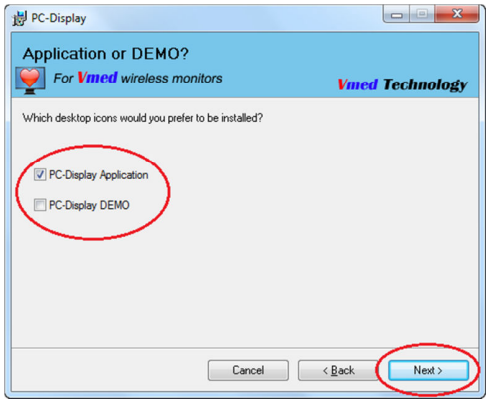
1. Click "Install PC-Display". When the following screen appears, click "Next".


PC-Display
Welcome to the PC-Display Setup Wizard
For Vmed wireless monitors
Vmed Technology
The installer will guide you through the steps required to install PC-Display 2.05.00 on your computer.
This software is protected under U.S. and international copyright laws. Please read the license agreement.
Cancel
< Back
Next >

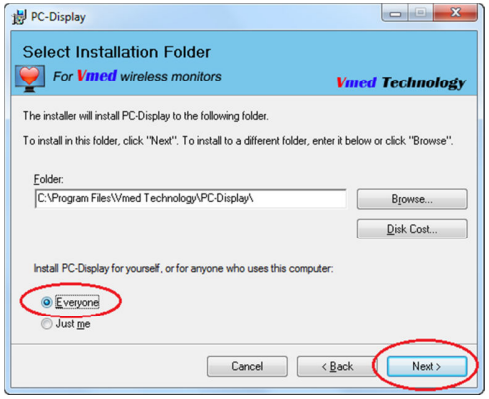
2. Read the license agreement; choose "I Agree" and then "Next".


PC-Display
License Agreement
For Vmed wireless monitors
Vmed Technology
Please take a moment to read the license agreement now. If you accept the terms below, click "I Agree", then "Next". Otherwise click "Cancel".
SOFTWARE LICENSE AGREEMENT
PLEASE READ THIS SOFTWARE LICENSE AGREEMENT CAREFULLY BEFORE DOWNLOADING OR USING THE SOFTWARE.
BY CLICKING ON THE "I AGREE" AND THEN "NEXT >" BUTTONS, OPENING THE PACKAGE, INSTALLING THE PRODUCT, OR USING THE EQUIPMENT THAT CONTAINS THIS PRODUCT, YOU ARE CONSENTING TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CLICK THE
I Do Not Agree
I Agree
Cancel
< Back
Next >

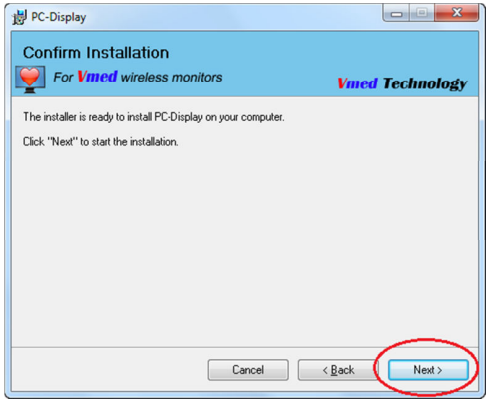
3. Select which icon(s) you wish to be installed on your desktop (both icons will still appear in the Start Menu regardless of your selection here). Then click "Next".



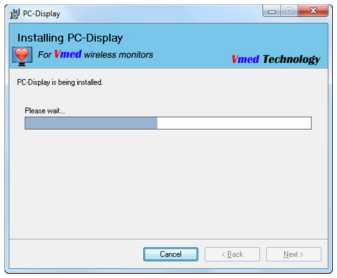
4. Choose “Everyone” and then “Next”.

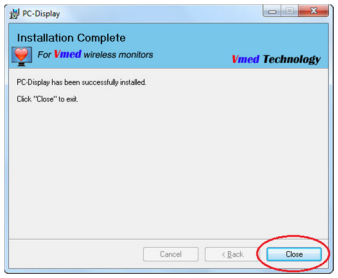

PC-Display
Select Installation Folder
For Vmed wireless monitors
Vmed Technology
The installer will install PC-Display to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\Vmed Technology\PC-Display\
Browse...
Disk Cost...
Install PC-Display for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

5. Then, click “Next” to begin the installation of files.



6. The files will be installed and then you may click “Close” to finish.





Continue installing any other programs such as the ECG Interpreter and then remove the installation CD.

NOTE: Shortcuts to the PC-Display and/or PC-Display DEMO programs will be placed on the Windows desktop and in the Programs folder of the Start menu. It is now recommended that you use PC-Display to connect to all Vmed wireless remotes.

Computer Video Resolution

PC-Display works best when the video resolution on your computer display is set to at least 1024 x 768 so that the entire PC-Display screen is easily viewable. Select `Start > Settings > Control Panel > Display > Settings` for Windows XP computers. Refer to software help menu for Windows 7 and Vista operating systems.

Installing Bluetooth

REFER TO THE APPROPRIATE SECTION BELOW FOR THE BLUETOOTH INSTRUCTIONS THAT APPLY TO YOUR OPERATING SYSTEM.

IF YOUR COMPUTER HAS A PRE-INSTALLED OR INTERNAL BLUETOOTH DEVICE, CONTACT YOUR VMED VENDOR FOR TECHNICAL ASSISTANCE.

IF YOU HAVE PREVIOUSLY INSTALLED ANY BLUETOOTH SOFTWARE, CALL THE VENDOR FROM WHOM YOU BOUGHT THIS PRODUCT FOR TECHNICAL ASSISTANCE.

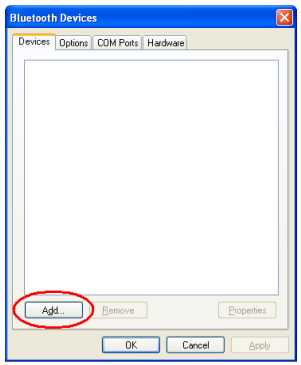
Bluetooth Installation and Discovery, Windows XP Service Pack 2 or 3

1. Plug the Bluetooth USB adaptor (Dongle) into a USB port on your computer.

2. Windows should automatically detect the device and respond with an audio prompt. A note confirming detection of the device should appear in the lower right hand corner of the display.

3. Double click the "Bluetooth Devices" icon on your desktop or select "Bluetooth Devices" from the "Control Panel" or from the "Start" menu.

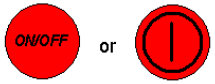
4. After the following "Bluetooth Devices" window appears click on the button marked "Add".



5. The following window should appear:

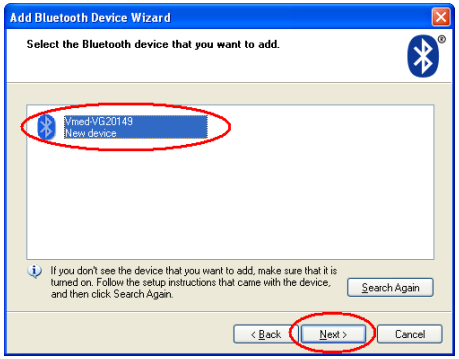
Add Bluetooth Device Wizard
Welcome to the Add Bluetooth Device Wizard
Before proceeding, refer to the "Bluetooth" section of the device documentation. Then set up your device so that your computer can find it:
- Turn it on
- Make it discoverable (visible)
- Give it a name (optional)
- Press the button on the bottom of the device (keyboards and mice only)
My device is set up and ready to be found.
Add only Bluetooth devices that you trust.
< Back
Next >
Cancel

6. Turn on your Vmed wireless remote by depressing the red button on the module's keypad.

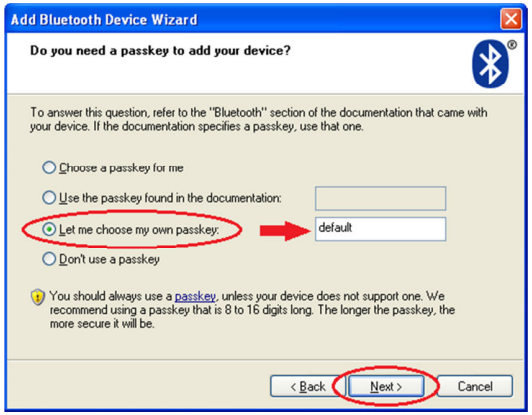


7. Wait for the "Status", "Connection" or "Computer" light on the wireless remote to turn amber and then put a check mark next to "My device is set up and ready to be found." on the Add Bluetooth Device Wizard window.

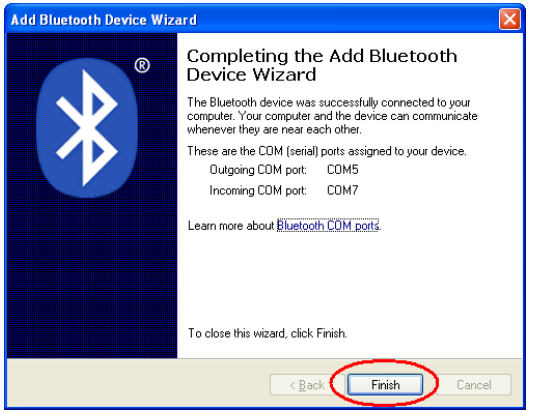
8. Click "Next" and your computer will search for the wireless remote. When the remote device has been discovered, a window similar to the one below will appear. The ID number following "Vmed-" will be the same as the ID number that is printed on the back label of the wireless remote (the below example uses a PC-VetGard+ with ID: VG20149, but the method is the same for all Vmed wireless remotes).


Add Bluetooth Device Wizard
Select the Bluetooth device that you want to add.
Vmed-VG20149
New device
If you don't see the device that you want to add, make sure that it is turned on. Follow the setup instructions that came with the device, and then click Search Again.
Search Again
< Back
Next >
Cancel

9. Highlight the identified Vmed wireless remote and click “Next”, which will open the following window:


Add Bluetooth Device Wizard
Do you need a passkey to add your device?
To answer this question, refer to the "Bluetooth" section of the documentation that came with your device. If the documentation specifies a passkey, use that one.
Choose a passkey for me
Use the passkey found in the documentation:
Let me choose my own passkey:
default
Don't use a passkey
You should always use a passkey, unless your device does not support one. We recommend using a passkey that is 8 to 16 digits long. The longer the passkey, the more secure it will be.
< Back
Next >
Cancel

10. Select the “Let me choose my own passkey” option and then enter “default” into the text entry box beside this. Then, click “Next”. When the window below opens, click “Finish”.

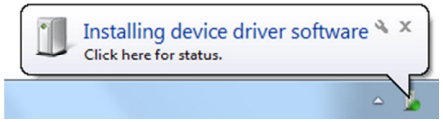

Add Bluetooth Device Wizard
Completing the Add Bluetooth Device Wizard
The Bluetooth device was successfully connected to your computer. Your computer and the device can communicate whenever they are near each other.
These are the COM (serial) ports assigned to your device.
Outgoing COM port: COM5
Incoming COM port: COM7
Learn more about Bluetooth COM ports.
To close this wizard, click Finish.
< Back
Finish
Cancel

NOTE: There should be two COM (Communications) ports listed on this window. They may be different for different discoveries and you should not have to remember them but you should verify that there are two listed.

Bluetooth Installation and Discovery, Windows 7 and Vista (SP2)

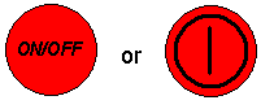
1. Plug the Bluetooth USB Adaptor (dongle) into an available USB port of your computer.

2. Windows should automatically detect the device and respond with an audio prompt. A note confirming detection of the device should appear in the lower right hand corner of the display.

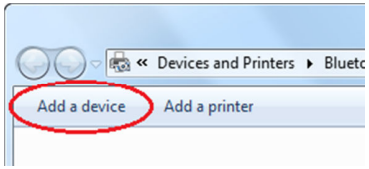


3. Once Windows has finished establishing the Bluetooth drivers for this adaptor double click the “Bluetooth Devices” icon in the bottom right portion of your desktop or select “Bluetooth Devices from the “Control Panel” through the “Start” menu (or select “Devices and Printers” from the “Start” menu if you are using Windows 7).

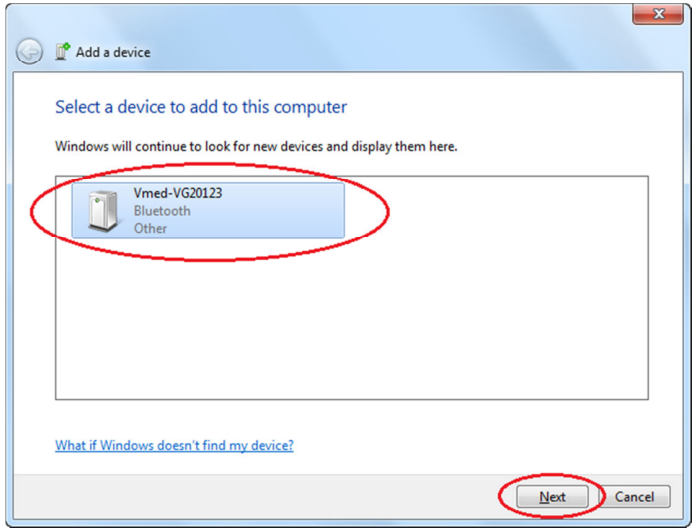
4. Turn on your Vmed wireless remote by depressing the red power button on the remote module’s keypad.



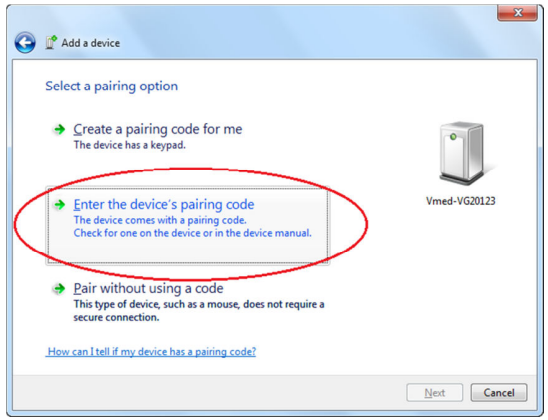
5. In the resulting devices window click the button marked “Add a device”.



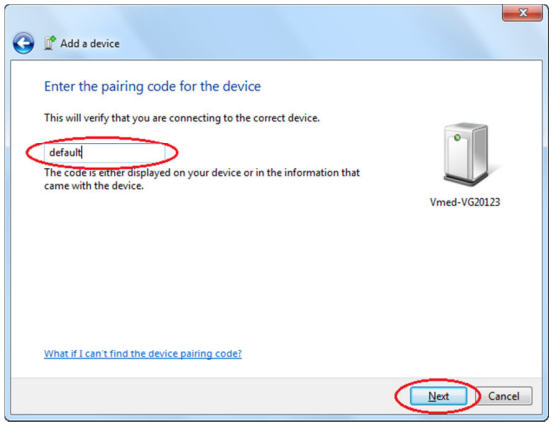
6. The devices window will display new devices as they are found. Select your Vmed remote device (in this example it is a PC-VetGard+ with the ID: VG20123, but the process is the same for all Vmed wireless devices). Once selected, click the Next button.



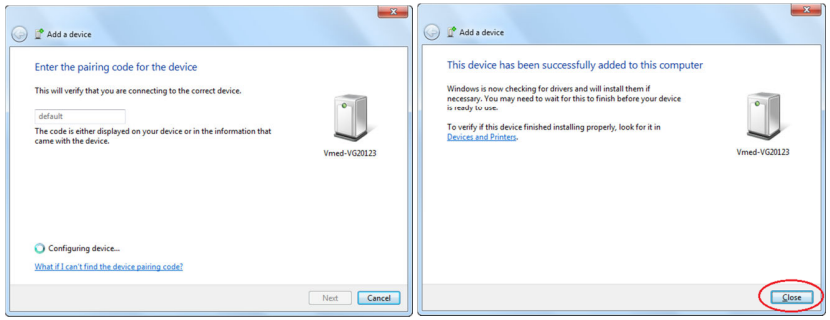
7. On the following screen, choose the middle option, “Enter the device’s pairing code”.


Add a device
Select a pairing option
Create a pairing code for me
The device has a keypad.
Enter the device's pairing code
The device comes with a pairing code.
Check for one on the device or in the device manual.
Pair without using a code
This type of device, such as a mouse, does not require a secure connection.
How can I tell if my device has a pairing code?
Vmed-VG20123
Next
Cancel

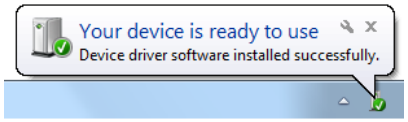
8. Then, enter the following pairing code: “default”. Click “Next” to proceed.


Add a device
Enter the pairing code for the device
This will verify that you are connecting to the correct device.
default
The code is either displayed on your device or in the information that came with the device.
Vmed-VG20123
What if I can't find the device pairing code?
Next
Cancel

9. This will begin the pairing of your Bluetooth device. Once the pairing process is complete then you will see a “Close” button. At this point, you may press this button to finish the pairing process.


Add a device
Enter the pairing code for the device
This will verify that you are connecting to the correct device.
default
The code is either displayed on your device or in the information that came with the device.
Vmed-VG20123
Configuring device...
What if I can't find the device pairing code?
Next
Cancel
Add a device
This device has been successfully added to this computer
Windows is now checking for drivers and will install them if necessary. You may need to wait for this to finish before your device is ready to use.
To verify if this device finished installing properly, look for it in Devices and Printers.
Vmed-VG20123
Close

10. You may also see a notification bubble verifying that the pairing process is complete.

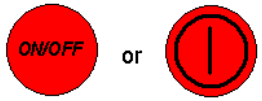


Bluetooth Installation and Discovery, Windows 8.1

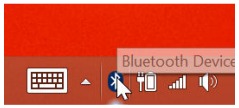
1. If your computer doesn’t have built-in or internal Bluetooth then plug the Bluetooth USB Adaptor (dongle) into an available USB port of your computer. Otherwise, skip to step 3.

2. Windows should automatically detect the device and respond with an audio prompt. A note confirming detection of the device should appear in the lower right hand corner of the display.

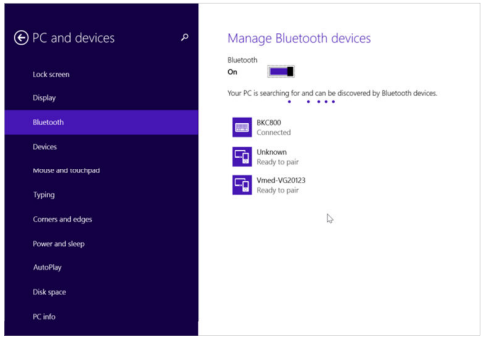
3. Turn on your Vmed wireless remote at this time by depressing the red power button on the remote module’s keypad. The “Status”, “Connection Status” or “Connection” light, depending upon your remote type, will initially turn red and then change to an amber color.



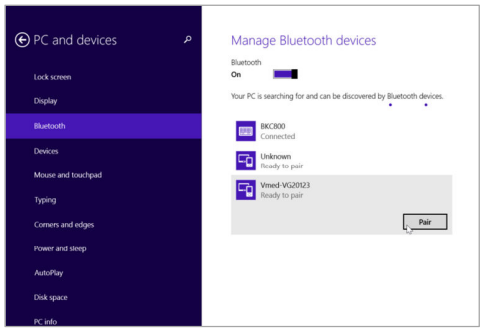
4. Double-click the “Bluetooth Devices” icon in the System Tray at the bottom right portion of your desktop.



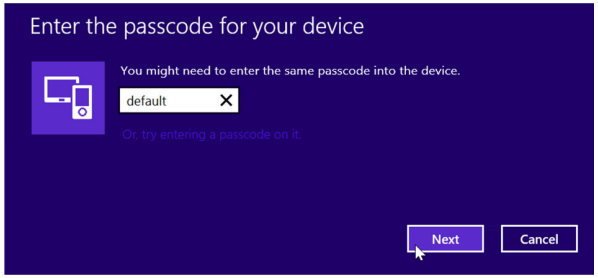
5. The Windows 8 Settings app should open to the “Manage Bluetooth devices” screen. It will automatically begin searching for available Bluetooth devices. Wait until your wireless remote appears in this list (its name will start with “Vmed-”).



6. Select your Vmed remote. Then, click the “Pair” button.



7. When asked for a passcode, enter the word “default” (this is case-sensitive).

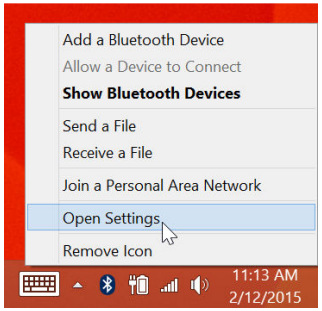

Enter the passcode for your device
You might need to enter the same passcode into the device.
default
Or, try entering a passcode on it.
Next
Cancel

8. Once you have done this then the pairing process is essentially complete.

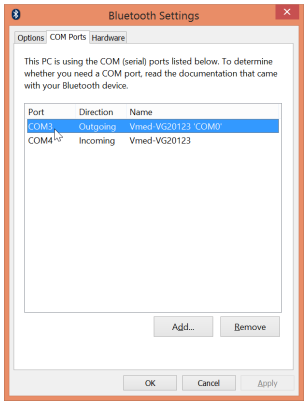
Configuring PC-Display for Internal Bluetooth

If your computer has internal Bluetooth then you may need to configure PC-Display for the specific COM ports that were added when you paired your remote. Proceed with these instructions if you are using Windows 7 or Windows 8.1.

1. Right-click the Bluetooth Devices icon in your System Tray at the bottom right of the screen and then choose “Open Settings”.



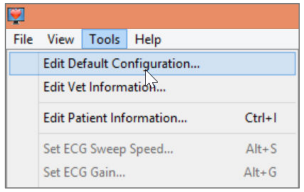
2. Click the “COM Ports” tab of the Bluetooth Settings window and locate the line that lists your Vmed wireless remote under the “Name” column and the word “Outgoing” under the “Direction” column. Note the number shown on this line next to “COM” under the “Port” column. In this example it is “COM3”.



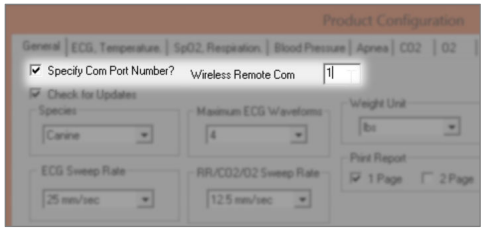
3. Double-click the PC-Display icon from the Desktop to open PC-Display. It should show the following error message. Click "Cancel".

Select Wireless Remote Connection
ERROR: A Wireless Remote was not found.....
Wireless Remote(s) may already be connected.
If a Wireless Remote has not been discovered, double click the Bluetooth Devices icon on the Desktop to add a wireless remote device.
Cancel

4. Choose "Edit Default Configuration" from the Tools menu of PC-Display.

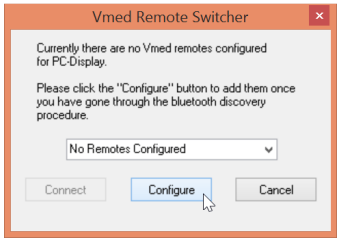


5. In the upper left corner of the Product Configuration window put a check mark in the box next to "Specify Com Port Number?". Then, in the text box to the right of "Wireless Remote Com" enter a positive number.

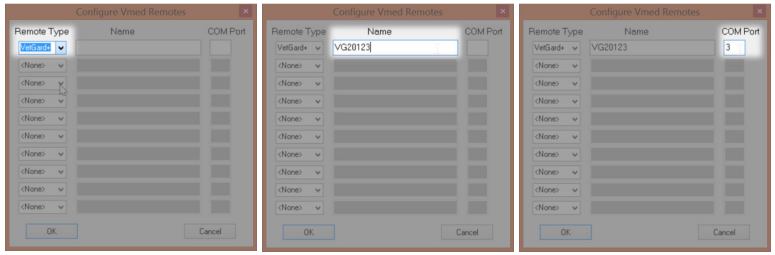


Then, click the OK button and close PC-Display.

6. Now, open PC-Display once more and when you see the "Vmed Remote Switcher" window click the "Configure" button.

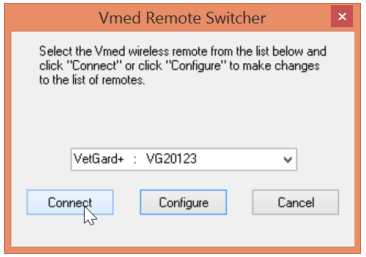

Vmed Remote Switcher
Currently there are no Vmed remotes configured for PC-Display.
Please click the "Configure" button to add them once you have gone through the bluetooth discovery procedure.
No Remotes Configured
Connect
Configure
Cancel

7. In the Configure Vmed Remotes window first select the remote type at the top left that corresponds to your Vmed wireless remote. Then, enter a name that will help you to later identify this remote such as its ID number. Finally, in the box at the right enter the COM port number that you noted in step 2.



8. Click the OK button followed by "Yes" to save these values.

9. You are now ready to click "Connect" to start the connection process with your wireless remote.


Vmed Remote Switcher
Select the Vmed wireless remote from the list below and click "Connect" or click "Configure" to make changes to the list of remotes.
VetGard+ : VG20123
Connect
Configure
Cancel

Repeat steps 1-2 and 6-9 for any additional Vmed wireless remotes that you have paired with this computer.

Setting PC-Display Defaults

This section describes the procedure to change the default settings that will apply each time the PC-Display program is opened. Default settings such as TONE, ALARM, ON/OFF, GRID, etc. may be overridden by clicking the "Edit Current Configuration" icon on the upper toolbar only if the remote is connected to your computer.

NOTE: The "Edit Default Configuration" will set the defaults for each time a wireless monitor is connected to PC-Display. If you wish to quickly make changes for the currently connected session only, you can click on the "Edit Current Configuration" toolbar button on the Windows display (Icon looks like a gear). However, whatever changes you make using the Current Configuration will only be effective for the current connection and not change the "Default" settings.

Figure 1: Edit Current Configuration Icon on PC-Display upper toolbar

To set PC-Display Defaults:

1. Double click the PC-Display icon on your desktop. The following window will open:

2. Click the "Cancel" button on the "Select Wireless Remote Connection" window.

3. Click the "File" menu and confirm that there is no check mark next to the "Connect Wireless Remote…" option. ***NOTE: This allows access to the "Tools" menu.***

4. Click "Tools" followed by "Edit Default Configuration…" and the following dialog box will open:

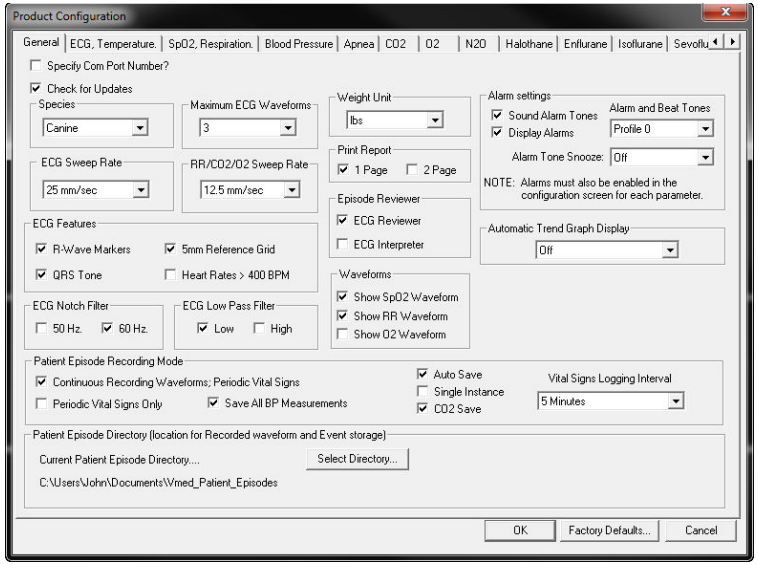


Figure 2: "Edit Default Configuration" menu.

Some selections in the Default Configuration menu apply only to certain wireless remote types. Each selection listing below will show which type of wireless remote can use it by including any of the following images next to it.

PC-Vet	
PC-VetGard	
PC-VetGard+	
PC-VetChek	
BP-AccuGard	

General Tab

Specify COM Port Number

Should NOT be checked in most situations. The appropriate COM port number should be entered here only in situations where Bluetooth software other than the Microsoft Windows Bluetooth driver is used. Please call Vmed for support if you are unsure whether you need this option. *FACTORY DEFAULT: UNCHECKED*

Check For Updates

If a checkmark is in the box next to "Check for Updates" then PC-Display will periodically check to see if a later version has been released. If an update is available PC-Display present you with the option to download it. There is also an option under the *Help* menu that will allow you to manually perform this check. *NOTE: Requires an active Internet connection to the computer where PC-Display resides. FACTORY DEFAULT: CHECKED*

Species

Select the most common species of patient that is seen. This will be the default for each new patient. *FACTORY DEFAULT: CANINE*

Maximum ECG Waveforms

Choose the maximum number of continuous Lead II ECG waveforms that you wish to appear on the screen (from 1-4). How many waveforms actually appear is equal to this number minus the number of other waveforms (SpO_2, Respiration/CO_2, O_2) that are also currently available and enabled. *FACTORY DEFAULT: 4*

Weight Unit

Set the default unit of weight measurement to appear in the Patient Information screen. The available options are "kgs", "lbs", "g" and "oz". *FACTORY DEFAULT: "LBS"*

Print Report

Choose the desired number of pages for the print report. Select two pages to display both waveforms. *FACTORY DEFAULT: 1 PAGE*

Alarm Settings

Sound Alarm Tones

If checked, this will allow the alarm tone to sound whenever an alarm is tripped. *FACTORY DEFAULT: CHECKED*

Display Alarms

If checked, all the designated alarm limits will be evaluated for an alarm event and the alarm tone (if enabled). If left unchecked, no alarm events or alarm tones will sound. *FACTORY DEFAULT: CHECKED*

Tone and Background Color Profile

If you are connecting to multiple wireless remotes on the same computer then you can choose individual profiles for the Alarm Beats and Tones to more easily differentiate the sounds and monitoring screens from each remote. Each of the four profiles has a unique sound for each of the following: heart beat from ECG, heart beat from SpO_2 and breath tone. This setting will be the default each time PC-Display is started. Additionally, each profile also as a background color for the waveform areas associated with it as well. Profiles 0-3 use the following background colors, respectively: black, navy, forest green and plum. To select a different profile for each remote simply open the Current Configuration window on the PC-Display upper tool bar after this remote has connected to PC-Display. *FACTORY DEFAULT: 0*

Alarm Tone Snooze

Set an automatic "snooze" on the alarm tone whenever it is silenced so that it will re-enable itself once the preset time has elapsed. The time options are 10 seconds, 30 seconds, 1 minute, 5 minutes, 10 minutes and 30 minutes. To turn off the alarm tones simply click the alarm tone toolbar button once more. *FACTORY DEFAULT: OFF*

ECG Sweep Rate

Select the desired sweep rate (Chart speed) as desired. Use a sweep speed of 50 mm/sec. for diagnostics and 25 mm/sec for surgery. This applies only to ECG and SpO_2 waveforms. *FACTORY DEFAULT: 25 MM/SEC*

RR/CO_2/O_2 Sweep Rate

Select the desired sweep rate for the respiration, CO_2 and O_2 waveform areas. *FACTORY DEFAULT: 12.5 MM/SEC*

Episode Reviewer

Select which Vmed software will open recorded episodes directly from the PC-Display toolbar: ECG Reviewer or ECG Interpreter. This depends upon which is installed. If neither is installed then this option is grayed out or invisible. *FACTORY DEFAULT: ECG REVIEWER*

Automatic Trend Graph Display

Choose the time interval of how often the trend graph will display automatically and momentarily throughout the procedure. *FACTORY DEFAULT: OFF*

ECG Features

R-Wave Markers

Checking this will display the white inverted triangles that appear above each beat in the ECG waveform area. Markers are helpful in detecting double-counting of beats. *FACTORY DEFAULT: CHECKED*

5mm Reference Grid

Checking this will display a reference grid behind the ECG and respiration/CO2/O2 waveform areas. The vertical scale of each rectangle in this grid is determined by the gain marker to the left of each waveform window, while the horizontal scale of each rectangle is

always 5 mm. *FACTORY DEFAULT: UNCHECKED*

QRS Tone

Checking this will enable a specific tone to sound with each beat. The tone will be different depending upon whether the heart rate is retrieved from ECG or from SpO2. Each of these tones will be different within each Beat Tone Profile. *FACTORY DEFAULT: CHECKED*

Heart Rates > 400 BPM

PC-Display has the ability to calculate heart rates greater than 400 BPM for exotic animals. For veterinary use on canine/feline patients leave the "Heart Rates >400 BPM box unchecked. *FACTORY DEFAULT: UNCHECKED*

Waveforms

Select which of the three waveforms (other than ECG) you would prefer to have automatically displayed upon startup. The BP-AccuGard makes use of the RR and O2 waveforms by default. *FACTORY DEFAULT: SPO2, RR CHECKED; O2 UNCHECKED*

ECG Notch Filter

The default ECG notch filter is used to filter AC line interference. For Domestic use (North America) choose 60 Hz. For international use choose 50 Hz. *FACTORY DEFAULT: 60 HZ*

ECG Low Pass Filter

Some instances of noise on the ECG signal can be reduced by selecting one of these filter types. *FACTORY DEFAULT: LOW*

Patient Episode Recording Mode

AutoSave

Auto Save is the default setting. A check mark in the "Auto Save" box enables automatic saving of all patient data upon connection to a remote device without manually pressing the green record button on the PC-Display upper tool bar.

Selecting Auto Save enables the default recording mode selection:

either *"Continuous Waveforms; Periodic Vital Signs" or "Periodic Vital Signs Only"*. *Continuous Recording* mode will save both ECG and/or CO_2 waveforms and vital signs. Selecting *Periodic Vital Signs Only* will record vital signs and monitoring events without any waveform data. *FACTORY DEFAULT: CHECKED; CONTINUOUS RECORDING* mode.

NOTE: The BP-AccuGard cannot record any waveform data no matter which option is selected.

The following table shows how to manage what is recorded.

Configuration Options			***Operation Actions***		***Data Recorded***
Auto Save	**Vital Signs Only**	**Continuous Recording**	**Record Button**	**Print Command**	
OFF	X	X	OFF	NO	Nothing
OFF	X	X	OFF	YES	24 sec. of ECG waveform and any events during that time including Print event
OFF	X	X	ON	NO	Waveform(s) and Events
OFF	X	X	ON	YES	24 sec. of ECG waveform and any events during that time including Print event
ON	ON	OFF	OFF	NO	Nothing
ON	ON	OFF	OFF	YES	24 sec. of ECG waveform and any events during that time including Print event
ON	ON	OFF	ON	NO	Events Only
ON	ON	OFF	ON	YES	Events only (no print event)
ON	OFF	ON	OFF	NO	Nothing
ON	OFF	ON	OFF	YES	24 sec. of ECG waveform and any events during that time including Print event
ON	OFF	ON	ON	NO	Waveform(s) and Events
ON	OFF	ON	ON	YES	24 sec. of all waveforms and any events during that time including Print event

Single Instance

Checking this will make it possible for only one instance of PC-Display to be open at a time on this computer. Selecting Multiple Instances allows multiple wireless remotes to be connected to this computer simultaneously. *FACTORY DEFAULT: UNCHECKED*

CO_2 Save

Checking this will allow the CO_2 waveform, or capnograph, to be saved in addition to the ECG waveform whenever Continuous Recording is selected. *FACTORY DEFAULT: CHECKED*

Save All BP Measurements

Checking this will cause PC-Display to save the vital signs each time a blood pressure measurement is complete. This will show up as a "vitals" event. *FACTORY DEFAULT: CHECKED*

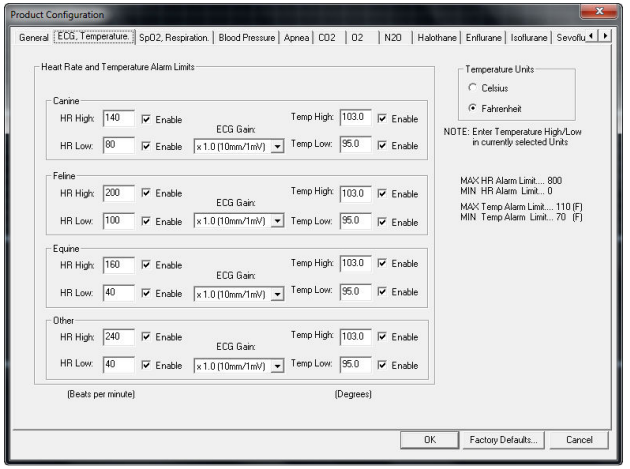
Vital Signs Logging Interval

This selection determines how often vital signs are automatically recorded to provide a record of the surgery. Intervals of 1, 3, 5, 10 and 15 minutes are possible as long as patient recording is enabled. A time reference stamp is also recorded. *FACTORY DEFAULT: 5 MINUTES*

Patient Episode Directory

This is the location where your patient data recorded files (referred to as "patient episodes") are stored from this computer. Click the "Select Directory…" button if you wish to change this location. *FACTORY DEFAULT: <LOCAL USER DIRECTORY>¥MY DOCUMENTS¥VMED_PATIENT_EPISODES*

ECG, Temperature Tab



Heart Rate and Temperature Alarm Limits

"High" and "Low" limits show the default values at which the alarm will be triggered for both heart rate and temperature. Additionally, each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Species	*HR High*	*HR Low*	*Temp* High*	*Temp* Low*
Canine	140	80	103.0	95.0
Feline	200	100	103.0	95.0
Equine	160	40	103.0	95.0
Other	240	40	103.0	95.0

**** Temperature values here are shown in Fahrenheit***

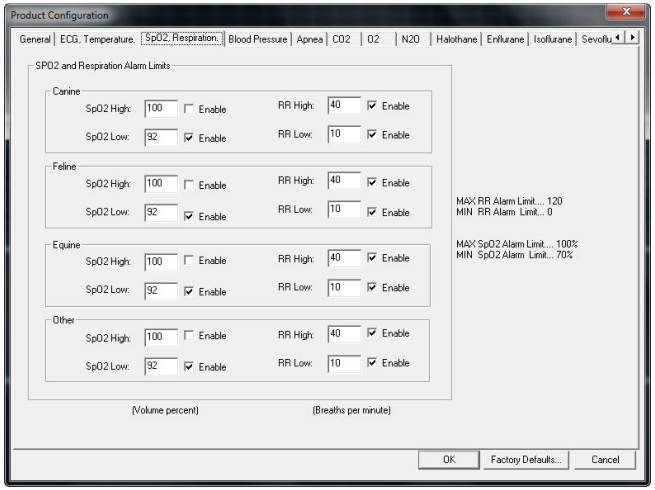
ECG Gain

The default ECG gain can now be set per species type so that this gain value will automatically be active when a patient of that species is selected for monitoring.
FACTORY DEFAULT: x1.0 (10mm/1mV) [for each species]

Temperature Units

The default temperature units can be selected here between Fahrenheit and Celsius. Alarm limits will automatically adjust to the temperature scale.
FACTORY DEFAULT: FAHRENHEIT

SpO2, Respiration Tab



SpO_2 Alarm Limits

The "High" and "Low" limits here show the default values at which the alarm will be triggered for SpO_2 on each species type. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

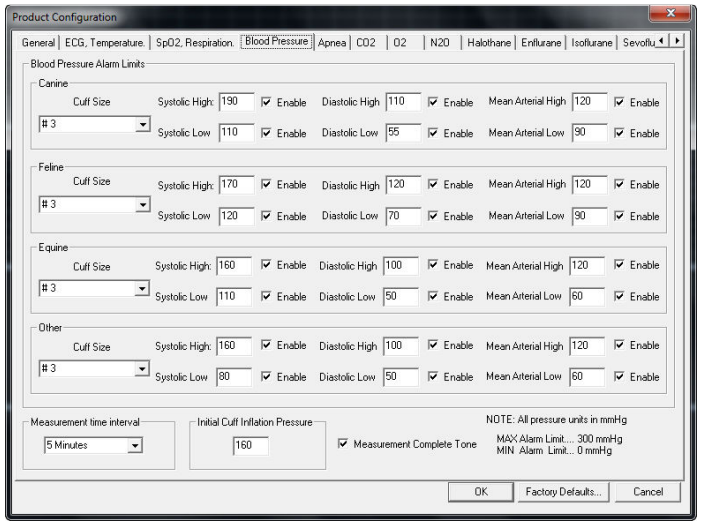
Species	*SpO2 High*	*SpO2 Low*
Canine	100	92
Feline	100	92
Equine	100	92
Other	100	92

Respiration Alarm Limits

The "High" and "Low" limits here show the default values at which the alarm will be triggered for "RR" (respiration) on each species type. Additionally, each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Species	RR High	RR Low
Canine	120	6
Feline	120	6
Equine	120	6
Other	120	6

Blood Pressure Tab



Blood Pressure Alarm Limits

The "High" and "Low" limits here show the default values at which the alarm will be triggered for the blood pressure values on each species type. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Species	Cuff Size	Sys High	Sys Low	Dia High	Dia Low	MAP High	MAP Low
Canine	NEONATE 3	190	80	100	50	120	60
Feline	NEONATE 3	160	80	100	50	120	60
Equine	NEONATE 3	160	80	100	50	120	60
Other	NEONATE 3	160	80	100	50	120	60

Measurement Time Interval

Determines how often blood pressure measurements will be taken automatically. Intervals of 1, 2, 3, 5, 10, 15, 30 and 60 minutes are available. *FACTORY DEFAULT: 5 MINUTES*

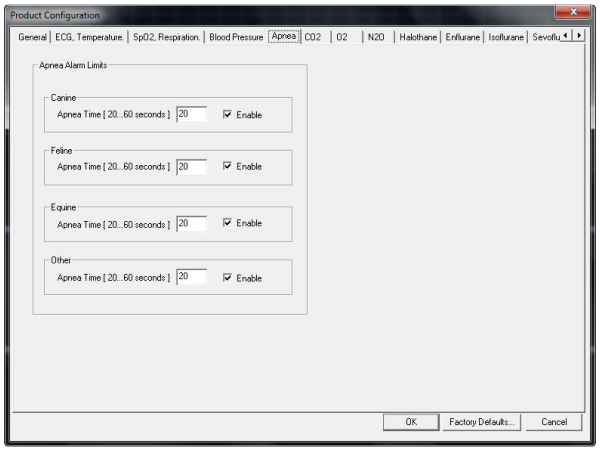
Initial Cuff Inflation Pressure

This value is the initial cuff pressure peak of the cuff inflation cycle, given in mmHg. This pressure should be 30 mm Hg over the expected systolic pressure. *FACTORY DEFAULT: 160*

Measurement Complete Tone

This tone is intended to sound at the completion of each blood pressure measurement. It is currently not functional. *FACTORY DEFAULT: CHECKED*

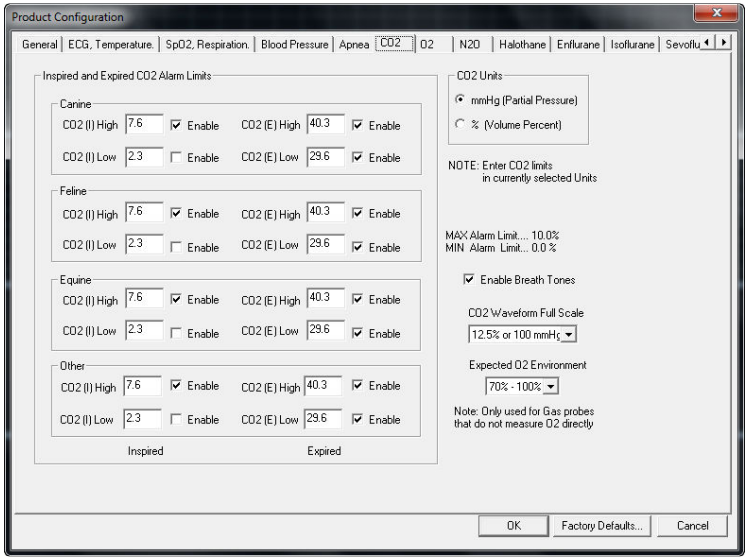
Apnea Tab



The "High" and "Low" apnea limits show are the default values at which the alarm will be triggered for when breathing stops for the time in seconds on each species type. The range for this time is 20 to 60 seconds. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Species	*Apnea Time*	*Enabled*
Canine	20 seconds	Yes
Feline	20 seconds	Yes
Equine	20 seconds	Yes
Other	20 seconds	Yes

CO_2 Tab



CO_2 Alarm Limits

The "High" and "Low" limits show the default values at which the alarm will be triggered for CO_2 inspired ($FiCO_2$) and expired ($ETCO_2$) values on each species type. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Species	Insp. High	Insp. Low	Exp. High	Exp. Low
Canine	7.6	2.3	40.3	28.9
Feline	7.6	2.3	40.3	28.9
Equine	7.6	2.3	40.3	28.9
Other	7.6	2.3	40.3	28.9

Units here are mmHg

CO_2 Units

The units shown in the alarm limit boxes are determined by which option is selected either - mmHg (Partial Pressure) or % (Volume Percent). If you enter numbers in one unit and then select the other then they will be automatically converted for you. *FACTORY DEFAULT: mmHg*

Enable Breath Tones

If checked, this option will sound a particular tone each time a patient's breath is detected by the CO_2 sensor. This tone will be different according to which sound profile is selected from the General tab. *FACTORY DEFAULT: CHECKED*

CO_2 Waveform Full Scale

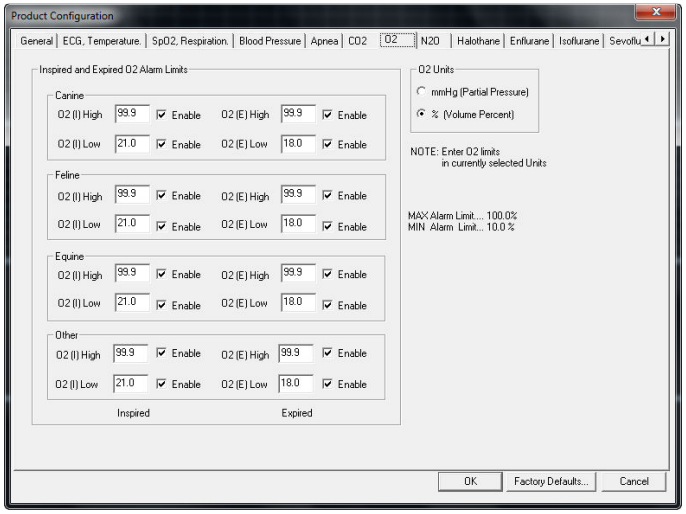
The Full Scale setting will determine the highest values that can be displayed on the CO_2 waveform graph (capnograph). For expected expired CO_2 values above 40 mmHg (5%) the 100 mmHg (12%) setting should be chosen. *FACTORY DEFAULT: 12.5% or 100 mmHg*

Expected O_2 Environment

This setting should only be needed with gas probes that do **not** measure O_2 directly. This will set the expected O_2 for the environment so that the gas probe can calculate its measured gas concentrations appropriately. *FACTORY DEFAULT: 70% – 100%*

O_2 Tab

This menu allows you to set default inspired (I) and expired (E) alarm limits for oxygen as measured with a mainstream gas sensor that is equipped with an O_2 plug sensor.


Product Configuration
General | ECG, Temperature. | SpO2, Respiration. | Blood Pressure | Apnea | CO2 | O2 | N2O | Halothane | Enflurane | Isoflurane | Sevoflu
Inspired and Expired O2 Alarm Limits
Canine
O2 (I) High 99.9 Enable O2 (E) High 99.9 Enable
O2 (I) Low 21.0 Enable O2 (E) Low 18.0 Enable
Feline
O2 (I) High 99.9 Enable O2 (E) High 99.9 Enable
O2 (I) Low 21.0 Enable O2 (E) Low 18.0 Enable
Equine
O2 (I) High 99.9 Enable O2 (E) High 99.9 Enable
O2 (I) Low 21.0 Enable O2 (E) Low 18.0 Enable
Other
O2 (I) High 99.9 Enable O2 (E) High 99.9 Enable
O2 (I) Low 21.0 Enable O2 (E) Low 18.0 Enable
Inspired
Expired
O2 Units
mmHg (Partial Pressure)
% (Volume Percent)
NOTE: Enter O2 limits in currently selected Units
MAX Alarm Limit... 100.0%
MIN Alarm Limit... 10.0 %
OK
Factory Defaults...
Cancel

O_2 Units

The units shown in the alarm limit boxes are determined by which option is selected either - mmHg (Partial Pressure) or % (Volume Percent). If you enter numbers in one unit and then select the other then they will be automatically converted for you. *FACTORY DEFAULT: % Volume*

O_2 Alarm Limits

The "High" and "Low" limits show the default values at which the alarm will be triggered for O_2 inspired and expired values on each species type. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

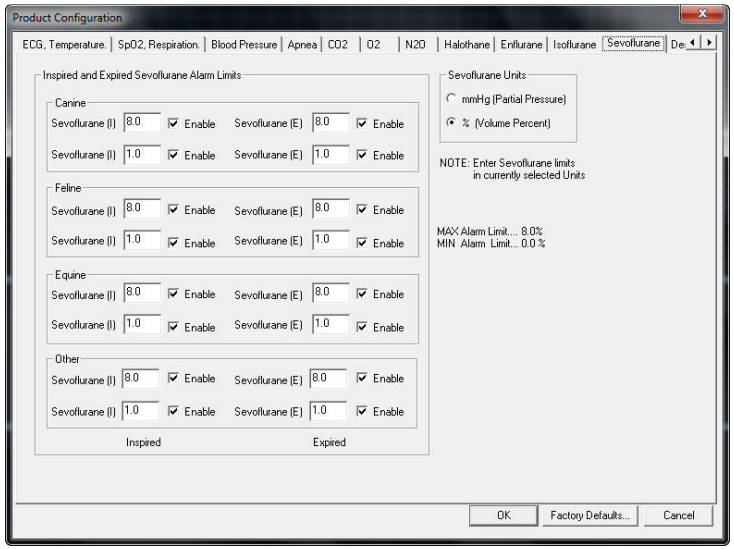
Species	Insp. High	Insp. Low	Exp. High	Exp. Low
Canine	99.9	21.0	99.9	18.0
Feline	99.9	21.0	99.9	18.0
Equine	99.9	21.0	99.9	18.0
Other	99.9	21.0	99.9	18.0

Units here are volume percent (%)

Agent Tabs

This menu allows you to set default inspired (I) and expired (E) alarm limits for the anesthesia agents that your PC-VetGard+ is equipped with. Select the tab that applies to your agent sensor. These values apply to the following gas types: N2O, Halothane, Enflurane, Isoflurane, Sevoflurane (pictured below) and Desflurane.

NOTE: Agent units display in mm HG or per-cent (%) volume. Be sure to check "Enable Display" where it applies.


Product Configuration
ECG, Temperature. | SpO2, Respiration. | Blood Pressure | Apnea | CO2 | O2 | N2O | Halothane | Enflurane | Isoflurane | Sevoflurane | De
Inspired and Expired Sevoflurane Alarm Limits
Canine
Sevoflurane (I) 8.0 Enable Sevoflurane (E) 8.0 Enable
Sevoflurane (I) 1.0 Enable Sevoflurane (E) 1.0 Enable
Feline
Sevoflurane (I) 8.0 Enable Sevoflurane (E) 8.0 Enable
Sevoflurane (I) 1.0 Enable Sevoflurane (E) 1.0 Enable
Equine
Sevoflurane (I) 8.0 Enable Sevoflurane (E) 8.0 Enable
Sevoflurane (I) 1.0 Enable Sevoflurane (E) 1.0 Enable
Other
Sevoflurane (I) 8.0 Enable Sevoflurane (E) 8.0 Enable
Sevoflurane (I) 1.0 Enable Sevoflurane (E) 1.0 Enable
Inspired
Expired
Sevoflurane Units
mmHg (Partial Pressure)
% (Volume Percent)
NOTE: Enter Sevoflurane limits in currently selected Units
MAX Alarm Limit.... 8.0%
MIN Alarm Limit... 0.0 %
OK
Factory Defaults...
Cancel

Agent Units

The units shown in the alarm limit boxes are determined by which option is selected either - mmHg (Partial Pressure) or % (Volume Percent). If you enter numbers in one unit and then select the other then they will be automatically converted for you. *FACTORY DEFAULT: % Volume.*

Agent Alarm Limits

The "High" and "Low" limits show the default values at which the alarm will be triggered for each agent inspired and expired values on each species type. Each limit can be enabled or disabled individually. The below table shows the *FACTORY DEFAULTS* for these values:

Agent*	Insp. High	Insp. Low	Exp. High	Exp. Low
N_2O	99.9	1.0	99.9	1.0
Halothane	5.0	1.0	5.0	1.0
Enflurane	5.0	1.0	5.0	1.0
Isoflurane	5.0	1.0	5.0	1.0
Sevoflurane	8.0	1.0	8.0	1.0
Desflurane	18.0	1.0	18.0	1.0

Units here are volume percent (%)

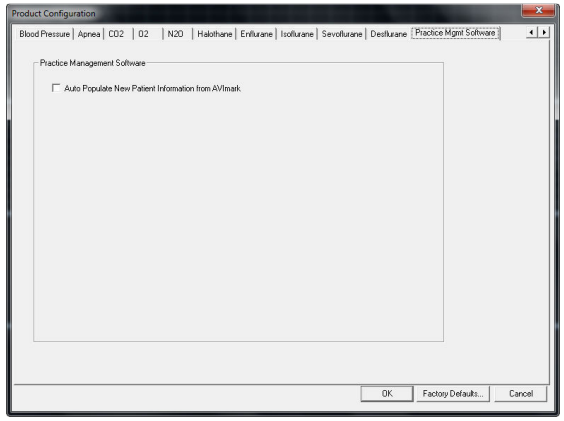
* *These default values are set the same for all listed species types. Please use professional judgment to determine if these values correspond with current veterinary practice standards for each species type.*

Practice Mgmt Software Tab

Select the "Practice Mgmt Software" tab to set PC-Display to interact with certain practice management software. *NOTE: Currently, PC-Display only interacts with AVImark practice management software. Additional programs may be added in the future.*

Put a checkmark in the box next to "Auto Populate New Patient Information from AVImark" in order to enable the automatic population of the PC-Display patient information fields each time a new patient is selected within PC-Display.

NOTE: AVImark software must be open and logged in and its COM Object feature enabled for this function to work.

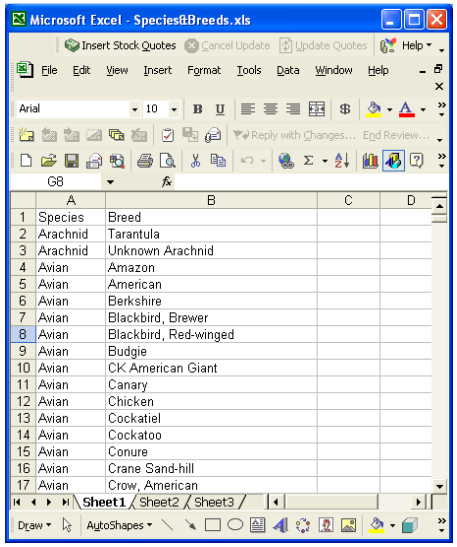


Customization of the Patient Information List

Species and Breeds available in the dropdown menu of the Patient Information window are user customizable using the following procedure (the use of Microsoft Excel is recommended for best results):

NOTE: The following exercise should be performed from the computer's administrative user account.

1. Verify that your computer has Microsoft Excel installed properly.
2. Click on the desktop 'My Computer' icon and navigate to the installation directory for PC-Display. For most users this will be '`C:\Program Files\Vmed Technology\PC-Display`'.
3. Select the file '`Species&Breeds.xls`' and then right click the mouse and select "Copy", then right click again in the white space of the window and select "Paste"
4. A file called '`Copy of Species&Breeds.xls`' will be created. Right click on this new file and choose 'Rename' then rename the file to '`CustomSpecies&Breeds.xls`'
5. Double click on "`CustomSpecies&Breeds.xls`". Excel should open it as shown below:



	A	B	C	D
1	Species	Breed		
2	Arachnid	Tarantula		
3	Arachnid	Unknown Arachnid		
4	Avian	Amazon		
5	Avian	American		
6	Avian	Berkshire		
7	Avian	Blackbird, Brewer		
8	Avian	Blackbird, Red-winged		
9	Avian	Budgie		
10	Avian	CK American Giant		
11	Avian	Canary		
12	Avian	Chicken		
13	Avian	Cockatiel		
14	Avian	Cockatoo		
15	Avian	Conure		
16	Avian	Crane Sand-hill		
17	Avian	Crow, American		

6. The spreadsheet can be edited to add species and breeds as desired. The following restrictions apply:
   - Entry A1 must remain "Species" and B1 "Breed".
   - The total number of characters per spreadsheet line (Species and Breed) must be less than 60
   - There can be no more than 25 different kinds of species
   - There can be no more than 500 breeds per species.
   - There can be no more than 2000 total entries in the spreadsheet.
   - Do not enter data in any columns except A and B
7. Save the edited spreadsheet.
8. Use Excel's "Save As" feature to save the spreadsheet as tab delimited text. The saved filename should be "**`CustomSpecies&Breeds.txt`**". This file is read by PC-Display to generate the species and breeds dropdown menus in the patient information dialog.

Interfacing With Practice Management Software

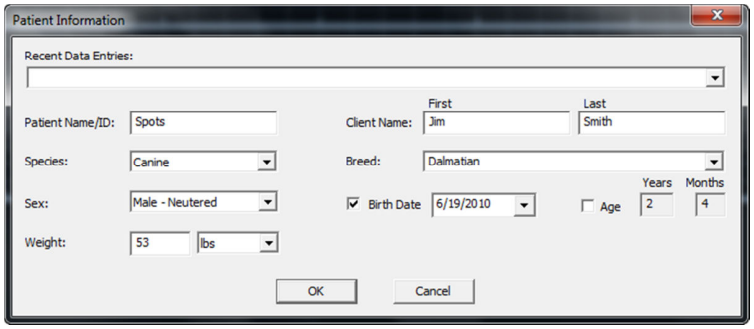
PC-Display now allows the user to interact with certain kinds of practice management software (only AVImark at the present time) for the purpose of automatically fetching patient information for use in saving patient episodes. The following shows how to accomplish this.

AVIMARK

1. Make sure that AVImark (version 2008.2 or higher) is running and logged in on the same computer that you are using with PC-Display and that the desired patient is shown in the AVImark CID.

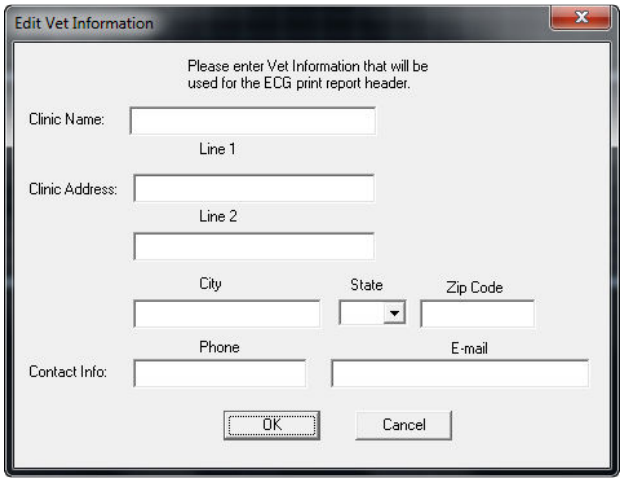
2. The "Auto Populate New Patient Information from AVImark" setting must be selected within the "Practice Mgmt Software" tab of the Default Configuration screen (see previous section).

3. Each time the "New Patient" option is chosen within PC-Display the available patient information will automatically be fetched and then filled in to the fields of the Patient Information screen. This also happens when first connecting to a remote.



Setup Vet/Clinic Information (USA and Canada)

1. Click the "Tools" menu on the upper tool bar of the PC-Display and then "Edit Vet Information" and the following window will appear:



2. Type in your vet/clinic information as above.

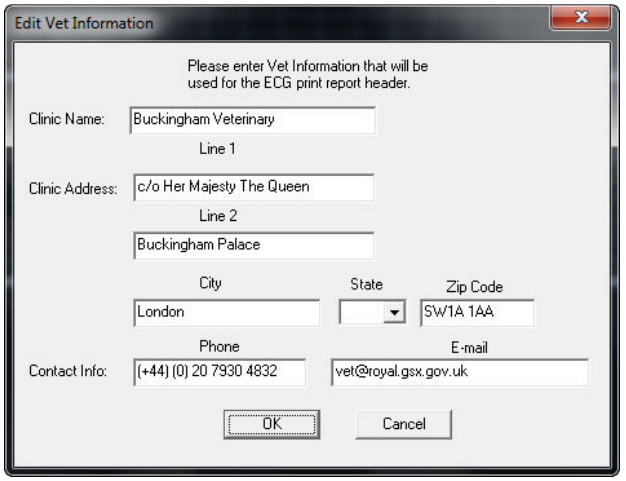
   NOTE: Your entries will be remembered each time the program is started and contains text that will be printed on all Reviewer generated reports.

3. Press OK. ***NOTE: Refer to the instructions later if you wish to add your clinic logo to the report heading.***

Setup Vet/Clinic Information (International)

The "Edit Vet Information" box as shown below has a pull down menu selection for state. All U.S. and Canadian States and Territories should be listed. If your clinic is not within one of these state selections, then select the entry which shows a blank. Use the other available entry boxes to fill in the specifics of your address.

1. Click the "Tools" menu on the upper tool bar of the Windows display and then "Edit Vet Information" and the following window will appear:



2. Type in your vet/clinic information as above.

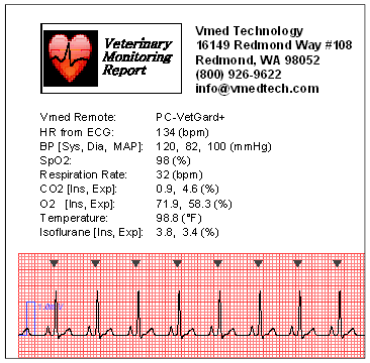
NOTE: Your entries will be remembered each time the program is started and contains text that will be printed on the ECG print report and all Reviewer generated reports.

3. Press OK.

NOTE: Refer to the instructions below if you wish to add your clinic logo to the report heading

Using Your Clinic Logo on Printed Reports

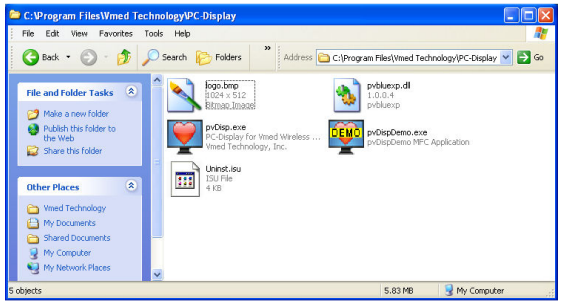
The default logo provided in the ECG report printout is shown below;



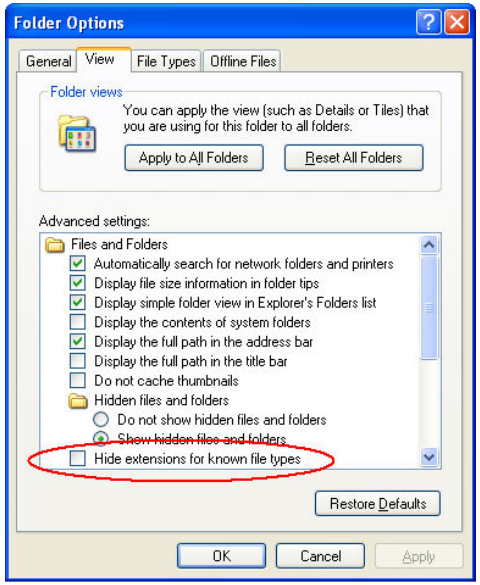
To customize a logo specific to your clinic

NOTE: Make sure that you perform this from the computer's administrative user account.

1. Click on the desktop 'My Computer' icon and navigate to the installation directory for PC-Display. For most users this will be, '`C:\Program Files\Vmed Technology\PC-Display`'. A screen similar to the one below will appear:



NOTE: You may need to turn on the file extensions first by clicking on the "Tools" menu of this Explorer window and then selecting "Folder Options…". Choose the "View" tab from the Folder Options window and then remove the checkmark next to "Hide extensions for known file types" within the Advanced settings box.


Folder Options
General View File Types Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Files and Folders
Automatically search for network folders and printers
Display file size information in folder tips
Display simple folder view in Explorer's Folders list
Display the contents of system folders
Display the full path in the address bar
Display the full path in the title bar
Do not cache thumbnails
Hidden files and folders
Do not show hidden files and folders
Show hidden files and folders
Hide extensions for known file types
Restore Defaults
OK
Cancel
Apply

2. Select the file 'logo.bmp' and then right click the mouse and select "Copy", then right click again and select "Paste".

3. A file called 'Copy of logo.bmp' will be created. Right click on this new file and choose 'Rename' then rename the file to 'customlogo.bmp'.

4. The image in this file will now appear on the printouts from PC-Display. Edit the file to create your own custom logo. The following constraints must be observed.

- The file must be named 'customlogo.bmp'
- Any size image can be used, but it will be stretched or compressed to 1024 by 512 pixels in the printout.
- Best results are achieved when image file is 1024 by 512.

NOTE: The image must be in .bmp format 24 bit color.

- Any photo editor can be used to create a custom logo. Most computers will at least have Windows Paint. If you have a logo as part of the header in a Word document it can be cut and then pasted into Windows Paint, resized and then saved.
- Vmed software upgrades will overwrite the original 'logo.bmp' file but will leave the 'customlogo.bmp' file untouched. Software upgrades should not affect the new logo.

NOTE: The 'Print Preview' function in PC-Display can be used to see how the new logo will look on the printout. An example is shown below.

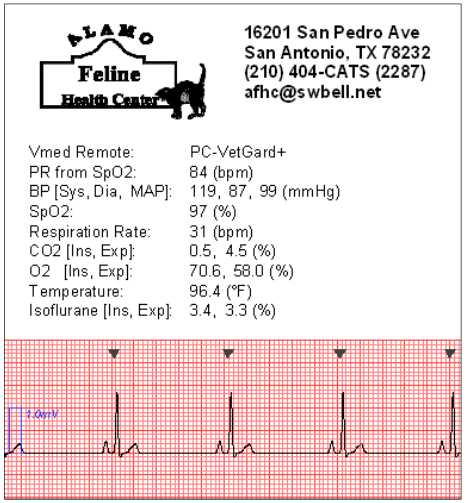


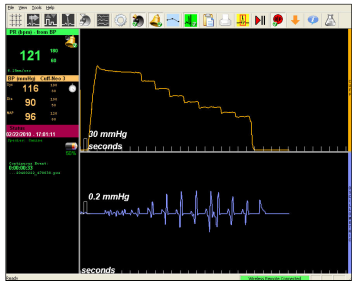
Figure 3 Sample print reports with customized clinic logo.

NOTE: Veterinary information changed by using the "Tools"> 'Edit Vet Information…' menu.

Chapter 2

Chapter 2 Description of Monitors

BP-AccuGard™ Blood Pressure Monitor



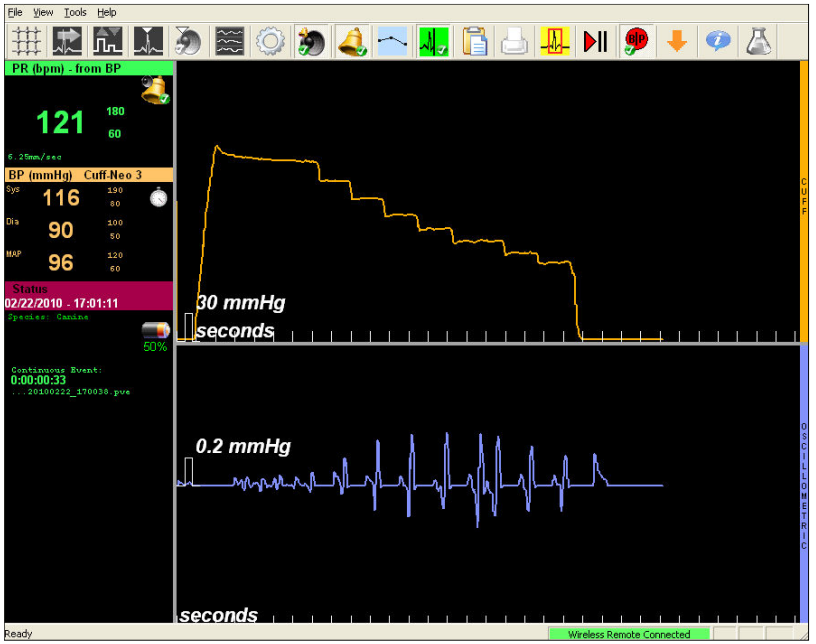
The BP-AccuGard is a digital oscillometric blood pressure monitor optimized for small animals. Oscillometric devices measure the oscillation of the vessel wall as the cuff is deflated. The BP- AccuGard uses sophisticated algorithms to calculate the blood pressure measurements from these oscillations based on the pressure in the cuff. While all oscillometric devices have limitations, especially with patient movement and the relatively small size of arteries in small animals, the BP-AccuGard software is successful in significantly reducing motion artifacts, resulting in fast, accurate measurements. Accurate measurements have been obtained on patients as small as 1.5 kg under anesthesia.

The BP-AccuGard includes manual and automatic modes for diagnostic and surgical applications. In manual mode, the measurement cycle is started each time a measurement is desired. Automatic mode allows repeat measurements taken at user defined intervals. Use as a stand-alone blood pressure monitor or use the PC-Display software to display measurements, real-time blood pressure waveforms and a trend graph on your computer screen.

BP-AccuGard Computer Screen

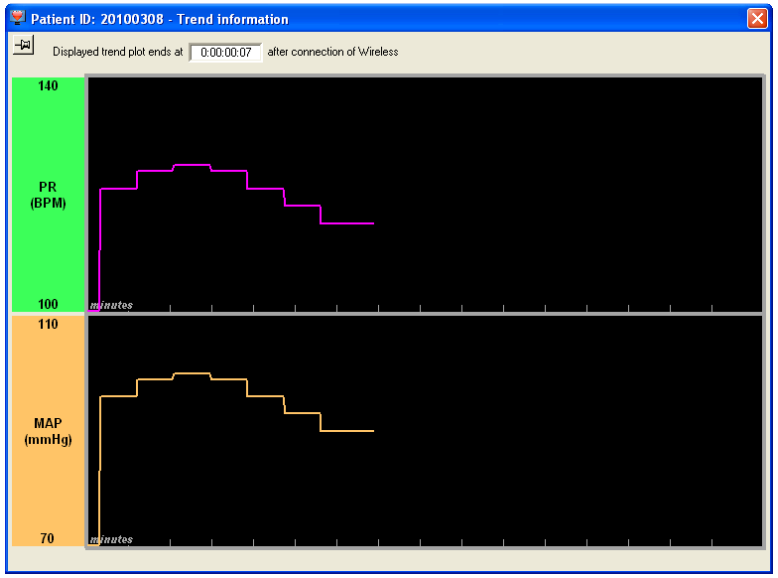
The BP-AccuGard when linked to a computer displays real time waveforms for the cuff inflation cycle and oscillometric pressure waveform. Refer to the BP-AccuGard user's manual for a complete description of the PC-Display application screen. Digital information displayed includes heart rate, systolic, diastolic and mean arterial pressures.

NOTE: Non-applicable toolbar icons are grayed out.

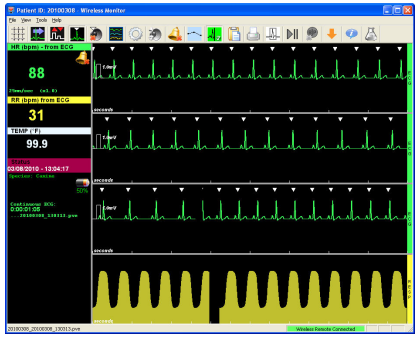


Trend Graph

A trend graph may periodically and momentarily appear over the display to plot Mean Arterial Pressure (MAP) and Pulse Rate trends if this option is enabled in the PC-Display configuration screen. The trend graph can also be viewed at any time by pressing the trend graph icon on the upper toolbar of PC-Display.



PC-VetChek ECG Screening and Recovery Monitor

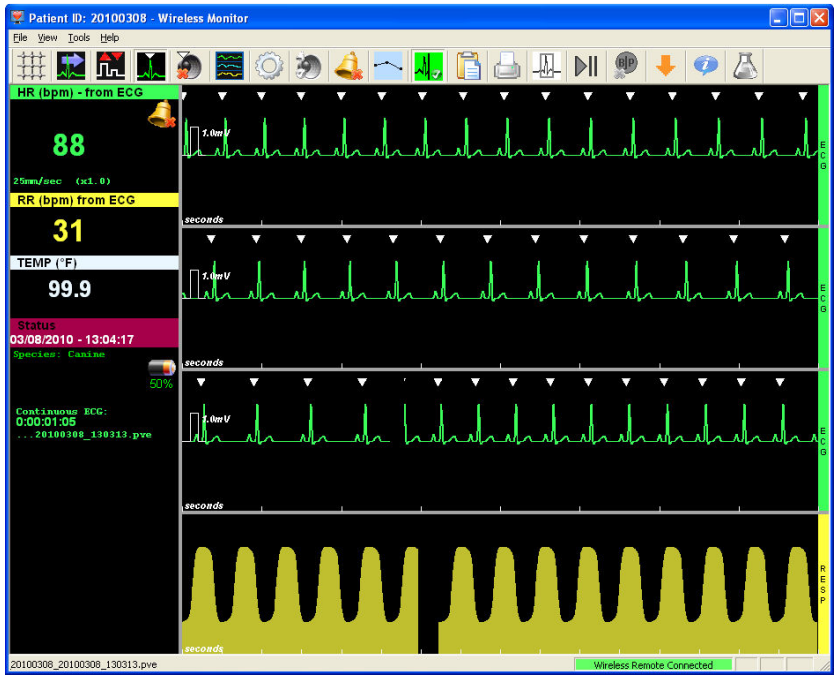


The PC-VetChek includes ECG leg clips, ECG chest sensor and a temperature probe. Commands can be activated from the remote keypad or the PC-Display upper toolbar on the computer. PC-Display toolbar icons and selector buttons on the PC-VetChek are active only if a wireless connection between the PC-VetChek and the computer is established. The PC-VetChek is designed to control some computer and ECG functions from the remote. Some commands, including the print command, can be activated from the remote keypad, however data that must be entered with a keyboard such as clinic and patient information cannot be entered from the remote key pad. The PC-VetChek can track ECG heart rates to 800 BPM.

Power is supplied by two AA batteries. Batteries will last for about 42 hours of continuous use. Battery life increases markedly by substituting long-life type AA batteries. Rechargeable AA batteries may also be used however a charger is not available through Vmed. Refer to the PC-VetChek user's manual for a complete description and use of the PC-Display software and PC-VetChek hardware.

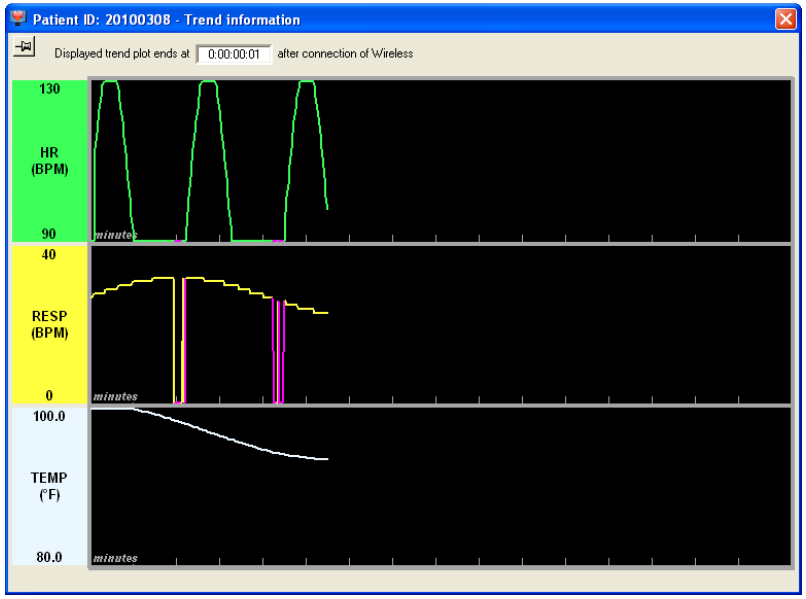
PC-VetChek Computer Screen

The computer screen displays digital heart rate, respiration rate (from ECG) and temperature. Note "R" wave markers and respiration waveform. Temperature is available from the temperature probe included or from optional ECG and temperature esophageal probes available in three sizes. Several upper toolbar icons are duplicated on the PC-VetChek remote control from the patients' side.

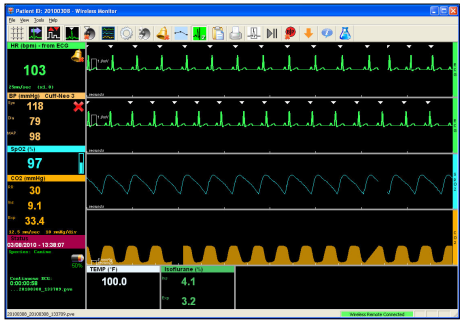


Trend Graph

A trend graph may periodically and momentarily appear over the display to plot heart rate, temperature and respiration trends if this option is enabled in the PC-Display configuration screen. The trend graph can also be viewed at any time by pressing the trend graph icon on the upper tool bar of PC-Display.



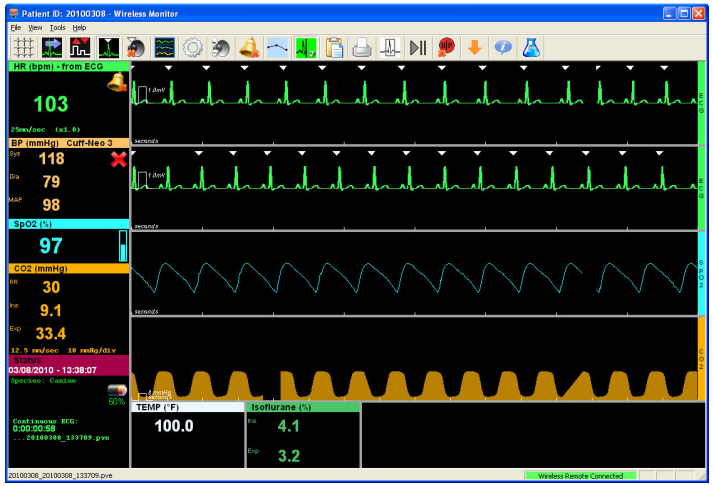
PC-VetGard+ Wireless Surgical Monitor



The PC-VetGard+ is a multi-parameter surgical monitor capable of monitoring and displaying ECG, heart rate, SpO_2, respiration (from ECG or mainstream gas sensors), temperature, non-invasive blood pressure (systolic, diastolic and MAP), CO_2, O_2 and five anesthesia agents. The PC-VetGard+ is modular, meaning that after the basic unit including ECG, temperature and SpO_2 is purchased, NIBP and gas sensors may be added without making the basic unit obsolete. Digital information, real-time waveforms and trending are displayed through a wireless link on a Windows based computer monitor.

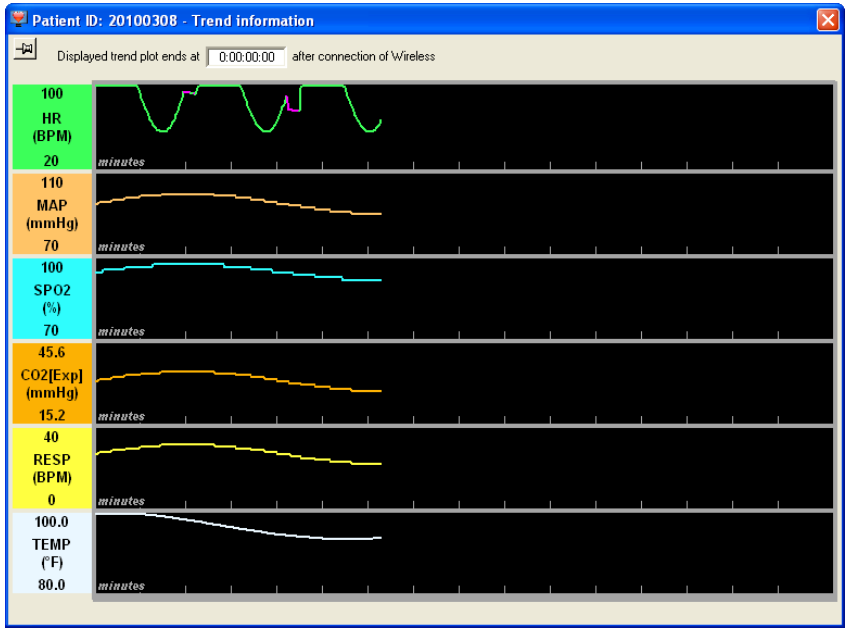
Computer Screen

The screen below represents the display of the most complete PC-VetGard+ including O_2 and anesthesia agent information. Several upper toolbar icons are duplicated on the PC-VetGard+ remote unit making them accessible from the patients' side.



Trend Graph

A trend graph may periodically and momentarily appear over the display to plot heart rate, Mean Arterial Pressure (MAP), SpO_2 , expired CO_2 , respiration, temperature [and expired O_2 if available] if this option is enabled in the PC-Display configuration screen. The trend graph can also be viewed at any time by pressing the trend graph icon on the upper tool bar of PC-Display.



Chapter 3

Chapter 3 Operating Instructions

Software

There are three software programs available for Vmed wireless monitors. PC-Display and Reviewer software are provided with each monitor purchased at no additional charge. The Vmed Interpreter software is for automatic interpretation of ECG files and is available as an option for PC-VetGard+ and PC-VetCheck monitors at an additional charge.

PC-Display Software

The Windows application program installed on your computer for the software processing and display of real time ECG and temperature (when an esophageal probe is used) information. This software can be installed on multiple computers without limit and simultaneous instances of the program can be run on a single computer subject to computer capability and the type of display used. ***NOTE: A large, flat panel display may be connected to your computer for greater visibility.***

Reviewer Software

The Vmed Reviewer program is used to open and review patient files saved from PC-Display. The Reviewer program is compatible with PC-VetChek and PC-VetGard+ patient monitors. Refer to Chapter 4 for a complete description of this program.

Interpreter Software

The Vmed ECG Interpreter is an optional ECG interpretation program that performs all the functions of the Reviewer program in addition to computer analysis of ECG complexes.

Software Updates

Ensure that you are always using the latest PC-Display software version. Doing this will increase performance and may fix some of the problems or issues that may occur.

PC-Display software will prompt you to check for updates periodically. You may also check for updates from the "Help" menu or by accessing www.vmedtech.com. The latest software install CDs are also available at a $15 charge by phoning (800) 926-9622.

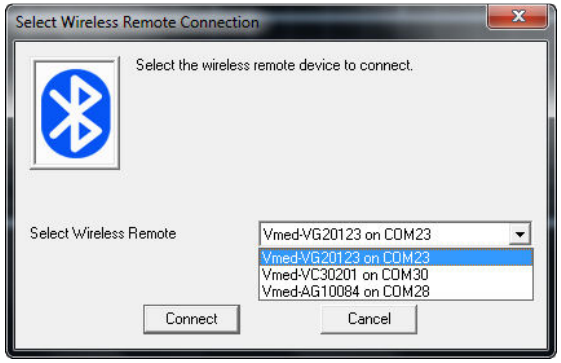
Wireless Connection

PROCEED ONLY AFTER YOU HAVE SUCCESSFULLY INSTALLED THE SOFTWARE AND HAVE COMPLETED THE BLUETOOTH DISCOVERY PROCESS (CHAPTER 1).

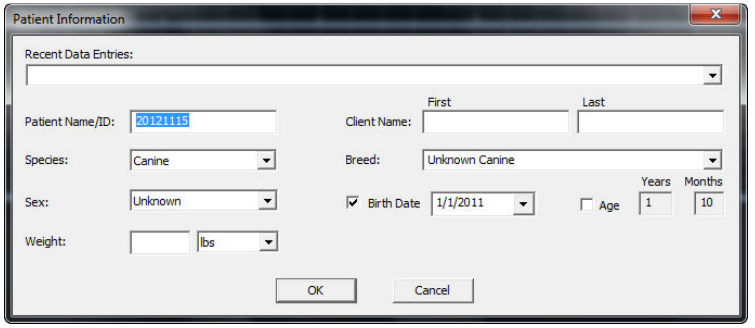
1. Prepare the monitor (wireless remote) being used.
2. Double-click the PC-Display icon on your desktop to start the program. This will open the PC-Display application and present you with the Connection window.

3. Turn on the remote by briefly depressing and releasing the red power key on the keypad (Do not hold the power key down). The "CONNECTION" or "COMPUTER" light will turn red and then amber.

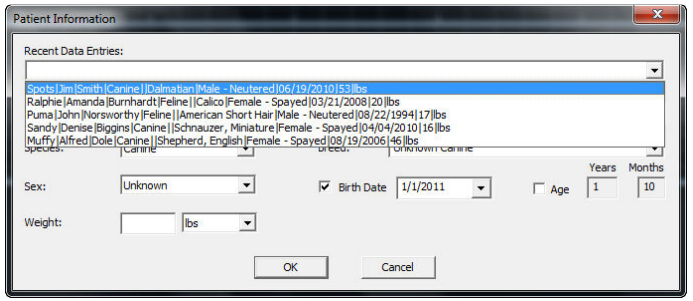
4. Select the remote to be used from the list in the Connection drop-down menu and then click the "Connect" button on the menu.

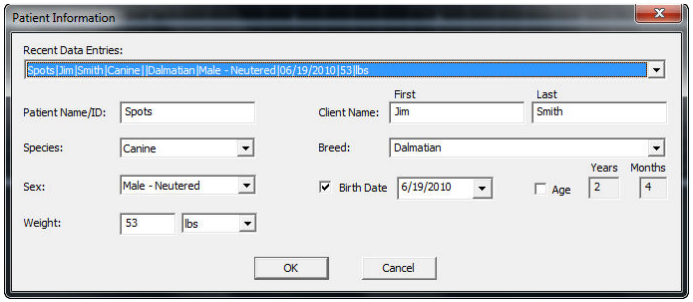


5. Input patient information (Vmed recommends at least entering information into the Patient Name field) and then click the "OK" button.



Alternately, if you wish to enter patient information for a patient for whom you have entered this information recently then you may select it from the "Recent Data Entries" combo box at the top of this window and this will automatically populate all associated fields. Once you have done this then you may click the "OK" button to begin the connection process.





6. Wait for the "CONNECTION" or "COMPUTER" light on the remote to turn from amber to flashing green. The process may take as long as 30 seconds to complete the first time after initial discovery.
7. When the remote status light begins blinking green, the notation in the STATUS box on the screen will change to "CONNECTED" and the notation at the lower right corner of the screen will change to: "Remote Connected" on a green background.

   NOTE: To preserve battery life, the remote will shut off automatically if connection to the computer is not established within 3 minutes of powering on the remote.

   When connection is complete, the ECG sweep appears on the display as a flat magenta colored line moving left to right at the selected sweep speed. Upon acquisition of a satisfactory ECG signal, the waveform will appear and the trace will change to a color corresponding to the sensor:

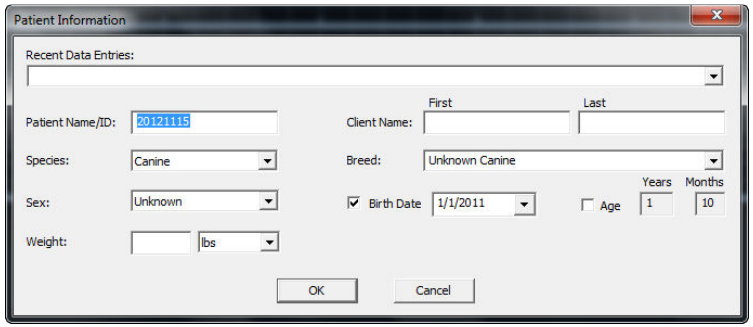
Green: Good ECG signal*
Magenta: ECG Leads Off or poor ECG signal quality
White: (DIGITS ONLY): Temperature
Yellow: Respiration from ECG

****A magenta ECG sweep represents a Leads Off condition and may occur even if a waveform is present, however the computer will not recognize a valid ECG and the digital heart rate display will not appear. Reposition ECG sensor and check for adequate moisture at contact.***

Setup Patient Information

NOTE: You may elect to enter patient information <u>after</u> completing the monitoring procedure if desired. This information may also be edited in the Reviewer Program. Vmed recommends at least entering a patient's name or ID in the "Patient Name" box prior to monitoring in order to make it easier to locate later on.

1. Select the "Tools" on the upper tool bar and then "Edit Patient Information". The following window will appear:



2. Type in desired information and press OK.

   NOTE: This window will automatically appear when connecting to a wireless remote or after selecting "New Patient…" from the File menu.

Sweep and Scale

Sweep: Sweep moves across the display from left to right at the selected sweep speed (chart speed). Default sweep speed is 25 mm/sec, which is preferred for surgical monitoring. A sweep speed of 50 mm/sec should be used for diagnostic ECGs. The sweep color is magenta if leads off or with poor electrode-patient contact and green with good electrode-patient contact. If the sweep is magenta, an ECG waveform may appear however a heart rate will not be displayed.

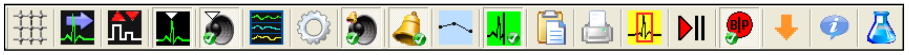
Vertical Scale: The vertical scale of the display and the print report measures signal amplitude. When gain is set at 1, the signal amplitude of 1mV has a vertical scale deflection of 10 mm by convention. A 1mV reference mark appears on the display and print report. Vertical scale deflection increases by a multiple of the gain and the 1mV reference mark also increases proportionately.

CAUTION: Grid spacing does not change with change in gain setting. Use amplitude reference marker (1mV) to estimate amplitude of ECG signals on the screen.

Horizontal Scale: Time is measured on the horizontal scale with hash marks on the display and print report every second.

Toolbar Buttons and Functions

The PC-Display Toolbar provides quick, easy access to several common functions within the PC-Display software. The following table will describe each button and its associated function within PC-Display.

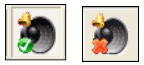


	The Grid Enable button is a toggle button that will overlay a wire-frame grid over both the ECG and CO_2 waveforms (when connected to a BP-AccuGard this will put a grid over both the cuff and oscillometric waveforms). The height of each rectangle within the grid is directly associated with the vertical scale marker at the bottom left of each waveform window.
	The Sweep Rate cycle button will allow the user to change the sweep rate of the ECG and SpO_2 waveforms by cycling through each of the available rates: 25 mm/sec, 50 mm/sec, 100 mm/sec or 200 mm/sec.. The current sweep rate will be denoted at the bottom of the ECG digital readout box.
	The ECG Gain cycle button will allow the user to change the gain (vertical scale factor) of the ECG waveform by cycling through each of the available gain settings: x0.5, x1.0, x2.0, x3.0 and x4.0. The current ECG gain setting will be denoted in perenthesis at the bottom of the ECG digital readout box.
	The R-wave Enable button is a toggle button that, if enabled, will place a white inverted triangle (R-wave marker) above each recognized beat in the ECG waveform area. This can be useful for determining whether the monitor is double-counting beats.
	The ECG Tone Enable button is a toggle button that will produce a tone whenever a heart beat is encountered during the monitoring session – from either ECG or SpO_2, depending upon which it is set to. It will usually default to the ECG, but if no Leads On ECG signal exists then it will revert to SpO_2 for both the heart rate and beat tone.
	The Waveform Selection button will bring up another window that gives the user the choice of which waveforms to display in the main monitoring screen at that time. For all available remotes it will always include the ECG waveform, but may also give the option for the SpO_2, CO_2 and O_2 waveforms, depending upon what is available with the current remote.
	The Current Configuration button allows quick access to the configuration of the current session. Any values that are modified here will return to the default values upon exiting PC-Display. More information about all of the configuration options is provided in Chapter 1.
	The Silence Alarms button is a toggle button whose factory default is to be enabled, meaning that any tripped alarm will sound the alarm tone. When disabled the alarm sound will cease regardless of how many parameters are out of range.

	The Monitor Alarms button is also a toggle button that is enabled by factory default. When enabled, this will show the alarm limits beside each digital value and provide a recorded alarm event and the audible alarm tone if those options are enabled as well. However, even if those options are still enabled they will not happen if this button is disabled.
	The Trend Graph button, when clicked, will open the Trend Graph window to show the values that are monitored for trends. Each different remote type will show trend information for different parameters, based upon that particular remote type. See the Chapter 2 for more information about the Trend Graph window.
	The Record Episode button is a toggle button that is by factory default enabled. When enabled, this button will record a patient episode file. When disabled then no parameters will be recorded unless the Print function is taken. See a later section of this chapter for more details.
	The Patient Information button will allow the user to change the patient information for the current recording session by opening the Patient Information window. This is the same window that appears when connecting to the wireless remote.
	The Print button will allow the user to print either 1 or 2 pages of ECG waveform information along with any patient information that has already been input so far in this monitoring session. Each time this button is pressed it will include one page's worth of ECG waveform prior to the point in time when the button was pressed. See a later section of this chapter for more details. This option is not available for the BP-AccuGard.
	The Review Episode button allows the user to open any of the recorded patient episode files that have been recorded in the current session directly into the Vmed reviewing software selected within the configuration window. See a later section of this chapter for more details.
	The Stop/Start button is a toggle button that by default is disabled (play). When it is clicked/enabled it will freeze the waveforms on the screen (pause) for easier viewing. To disable it again simply click it once more. Clicking on this button will not pause any recorded measurements that are in progress – only what is viewed on the screen.
	The BP Measurement button is also a toggle button that is disabled by default. Once clicked to enable, it will initiate the automatic measurement process once a cuff size has been selected from the resulting window. This option is only available for remotes with blood pressure capability (PC-VetGard+ and BP-AccuGard).

	The Marker button allows one to quickly record a vital signs event ("marker" event) if an episode is being recorded.
	The Info button allows quick access to version information for PC-Display as well as any connected wireless remote. This button may only be necessary when speaking to a support representative.
	The Gas Selection icon allows the user to select the Primary and Secondary agents to monitor if the associated gas sensor is connected to the PC-VetGard+.

It is important to note that some of these Toolbar icons with toggle functionality have either a green check mark or a red 'x' at the base of the icon as shown below.



This is to denote whether the function this icon represents is currently enabled or disabled, respectively. Additionally, the buttons that show they are enabled will usually also have a recessed look to make this concept clearer.

Alarms and Sounds

PC-Display has several sounds that are useful for monitoring a patient when not always looking at the screen. There are primarily 3 different kinds of sounds within PC-Display that help to serve this purpose.

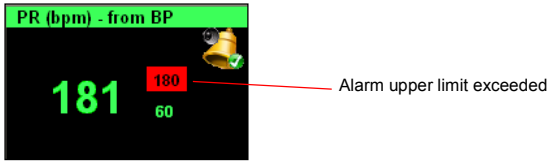
Alarm Tone

The alarm tone is a continuous sound of two rapidly alternating tones for as long as its function is active. The alarm tone can only be active if the following conditions are met:

a. The Monitor Alarms button is enabled
b. The Silence Alarms button is enabled (disabled would mean that the alarm is silenced)
c. An alarm is tripped (one of the parameters with an alarm limit has exceeded that limit)

If a parameter's alarm limit has been exceeded while the alarms are enabled then for as long as this parameter is out of its normal range the alarm tone will be active (it will continuously play). However, if the user disables the Silence Alarm button and then re-enables that button then the alarm tone will no longer be active until that parameter changes to another value that is out of range.

Additionally, if a parameter is out of range then the same alarm tone will sound no matter which parameter is out of range. To give the user a visual cue as to which parameter has gone out of range, the numbered alarm limit next to each vital signs parameter will change to black digits on a red background.



Heart Rate Tone

For each remote type that produces a heart rate or pulse rate from ECG or SpO_2, PC-Display will provide a heart rate tone consistent with the current heart rate or pulse rate shown. If the remote in use has a Leads On ECG signal (green tracing) then the heart rate and its associated tone will come from the ECG measurement. However, in the PC-VetGard(I) and PC-VetGard+ remotes where SpO_2 can be used, the pulse rate will default to what is measured from SpO_2 and the tone will change accordingly. The heart rate tone can easily be enabled or disabled from the ECG Tone Enable button of the toolbar.

There are two kinds of heart rate tones: from ECG and from SpO_2. These tones are different in order to provide the user an audible cue that the heart rate is coming from one source over another. This can be helpful if, for example, the heart rate was coming from ECG and then suddenly switched to SpO_2. The user would take note that the most probable reason is that the ECG is now Leads Off, which would prompt the user to investigate and correct this sooner rather than had no audible cue alerted them to this.

Breath Tone

For the PC-VetGard+ with a gas probe connected, PC-Display also provides a breath tone each time the patient takes a breath. This tone is altogether different from the heart rate or alarm tones in order to give the user yet another audible cue to one of the patient's vital signs - in this case, the respiration rate. This tone will sound only if enabled in the Configuration window under the CO_2 tab.

In addition, PC-Display now makes 4 sets of tones available for each monitoring session. Each set is referred to as a profile. Each profile includes two heart rate tones (ECG and SpO_2) and a breath tone. These profiles exist for the purpose of differentiating which remote and patient each sound is coming from if more than one remote is being used in the same location.

Recording Monitoring Information

The default setting for recording (save to file) information through PC-Display varies with each monitor. In general, "Continuous Recording waveforms; Periodic Vital Signs is the default setting for PC-VetChek (and PC-Vet) and the PC-VetGard+. Waveforms and vital signs are recorded in this mode. "Periodic Vital Signs" is the default setting for the BP-AccuGard. The "Periodic Vital Signs" mode will record vital signs at the interval selected as well as vital signs when an alarm is tripped or a marker or print command are initiated.

Unless "Auto Save" is checked on the Default Configuration screen, manually pressing the Record Episode button on the "Tools" selection on the PC-Display toolbar will initiate the recording command. Clicking once on this button will place a checkmark in the bottom right corner of the button itself to show that it is enabled. Clicking it again will disable this recording mode and close the episode file that was just recorded.

Toggle Continuous ECG Button (Disabled and Enabled)

If "Auto Save" is checked, recording will begin automatically upon connection to the computer and a check mark will appear within the Record Episode button on the upper tool bar.

NOTE: The Record Episode button should not be disabled until the monitoring episode is complete.

The Reviewer/Interpreter icon is activated after the file is saved upon disabling the Record Episode button, which disables the recording function. The saved file can be opened by clicking the yellow icon on the device control panel or the PC-Display toolbar and selecting the desired episode.

Printing

Printing a waveform report can be done from the PC-Display toolbar or the remote keypad (if connected to the computer), however only the waveform report will be printed by this method. To obtain a complete print report, the report must be printed from the Reviewer/Interpreter program. (See Chapter 4 for instructions to print from these programs.)

TO PRINT A WAVEFORM REPORT

1. From the remote keypad: Press the Print key, or…
2. From the PC-Display upper tool bar: Click the print button, or…
3. From "File" choose print.
4. Select "Scale to fit" or "shrink to fit" on the printer setup dialog box.

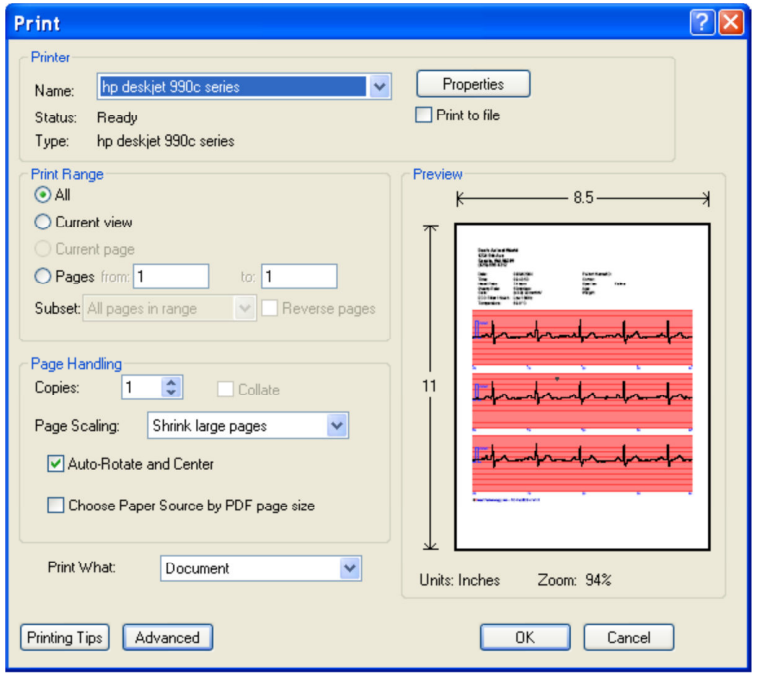
NOTE: Printing from the screen requires wireless connection between the remote and the computer. Printing from saved and recalled files in Reviewer or Interpreter does not require a wireless connection. A color printer is required to reproduce the colored grid. Files may also be printed to PDF using Adobe or PrimoPDF.

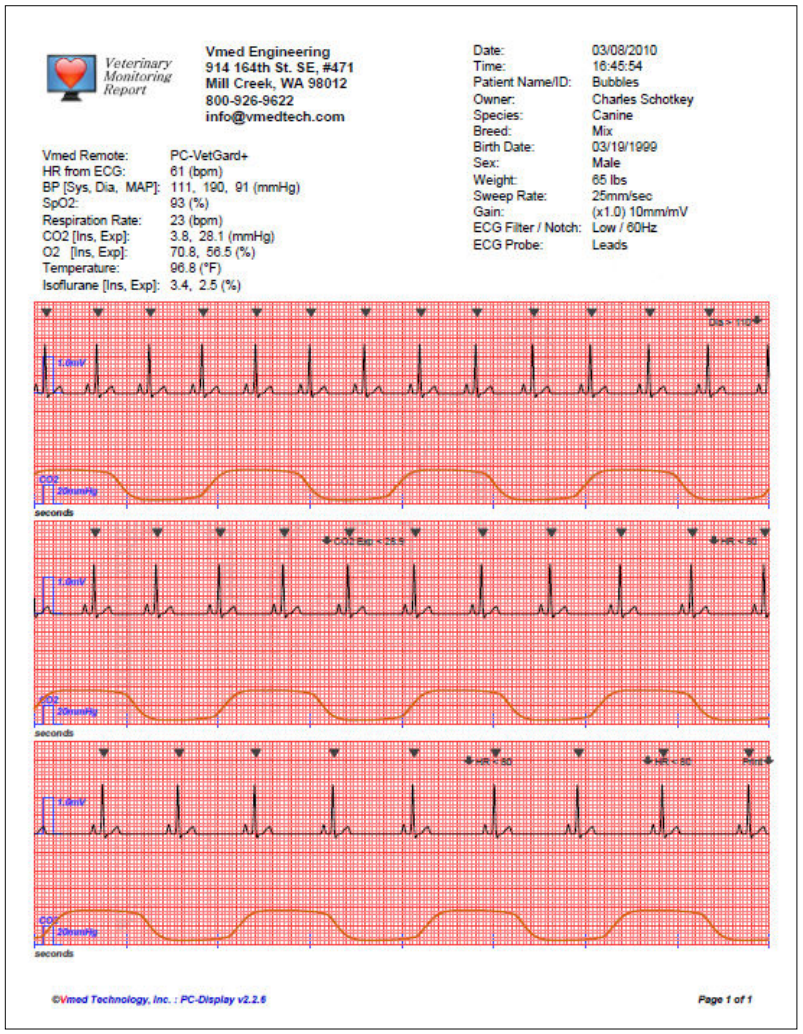
PC-Display offers 2 choices for printing: 1 page or 2 pages. Each page includes 600 millimeters (200 per line) of ECG waveform data. This means that when the user chooses the Print option, then the printed page will include a waveform from the time the Print option was chosen backward. Each page will have the number of seconds of waveform according to the current ECG sweep rate at the time of printing. The following table will describe this further.

Sweep Rate	Waveform Seconds Per Page
25 mm/sec	24
50 mm/sec	12
100 mm/sec	6
200 mm/sec	3

Additionally, if using the PC-VetGard+ with CO_2 then the printout will also include the CO_2 waveform just below the ECG waveform.

Example of the Print dialog box and a sample waveform print report follow.





Veterinary Monitoring Report

Vmed Engineering
914 164th St. SE, #471
Mill Creek, WA 98012
800-926-9622
info@vmedtech.com

Date:	03/08/2010
Time:	16:45:54
Patient Name/ID:	Bubbles
Owner:	Charles Schotkey
Species:	Canine
Breed:	Mix
Birth Date:	03/19/1999
Sex:	Male
Weight:	65 lbs
Sweep Rate:	25mm/sec
Gain:	(x1.0) 10mm/mV
ECG Filter / Notch:	Low / 60Hz
ECG Probe:	Leads

Vmed Remote:	PC-VetGard+
HR from ECG:	61 (bpm)
BP [Sys, Dia, MAP]:	111, 190, 91 (mmHg)
SpO2:	93 (%)
Respiration Rate:	23 (bpm)
CO2 [Ins, Exp]:	3.8, 28.1 (mmHg)
O2 [Ins, Exp]:	70.8, 56.5 (%)
Temperature:	96.8 (°F)
Isoflurane [Ins, Exp]:	3.4, 2.5 (%)

©Vmed Technology, Inc. : PC-Display v2.2.6

Sample print report [Note signal amplitude (1 mV) reference scale and time reference points on horizontal axis].

PC-Display Keyboard Shortcuts

PC-Display has several keystroke combinations that can be used to quickly access certain functions using the computer's keyboard. Most of these keystrokes involve a combination of keys being pressed at the same time. For instance, "Alt+H" denotes that the "Alt" key and the "H" key should be pressed at the same time to achieve the desired results. Likewise, "Cntl" denotes the Control key.

Keystroke	Action	Description
Alt+C	Connect Wireless Remote	Toggles between PC-Display trying to connect to a remote or not. NOTE: When PC-Display is not trying to connect the "Edit Default Configuration" option is enabled beneath the "Tools" menu.
Cntl+I	Edit Patient Information	Opens the window allowing the user to edit the current patient's name or ID, client name, species, breed, age, sex and weight. If the session is being recorded then this recorded episode will reflect any changed values.
Cntl+N	New Patient	Opens the window allowing the user to input the next patient's name or ID, client name, species, breed, age, sex and weight. This will begin a new episode if the current session is already recording.
Cntl+P	Print	Opens the print dialog window allowing the user to print the last 30 seconds of the current ECG strip (this same strip will be recorded into an episode as well).
Cntl+G	Show Grid	Toggles the grid behind the ECG waveforms on or off.
Cntl+M	Show R-Wave Marker	Toggles the triangular R-Wave markers that appear above each detected R-Wave of the ECG waveform on and off.
Cntl+T	Show Trend Graph	Opens the Trend Graph window.
Alt+S	Set ECG Sweep Speed	Allows the user to select which sweep speed to use for the ECG waveform.
Alt+G	Set ECG Gain	Allows the user to select which gain to use for the ECG waveform.
Cntl+E	Edit Current Configuration	Opens the configuration window allowing the user to edit many of the parameters of PC-Display's current session without disconnecting the remote.
Cntl+Q	Enable QRS Tone	Toggles on or off the tone made for each heart beat.
Cntl+A	Enable Alarm Tones	Toggles on or off the tones made when an alarm limit has been exceeded. This can essentially act as a "silence alarm" feature.

Keystroke	Action	Description
Alt+A	Enable Alarms	Toggles on or off the alarm limits for all values.
Alt+R	Review Stored Episode	If a complete episode has been recorded in the current session then this will open the "Wireless Remote Review Episode" window.
Cntl+R	Record Patient Data	Toggles on or off the recording of patient data to a stored episode.
Alt+P	Play/Halt	Toggles on or off the progression of waveforms on the screen (similar to freezing or unfreezing the current display).
Alt+M	Mark Event	Places an orange triangular mark at that moment on the ECG waveform for later reference. Additionally, if an episode is not already being recorded this will record a brief episode with the mark listed as an event.
Cntl+H	About PC-Display and Remote	Opens the About window for PC-Display. If a remote is connected at the time then this window will also display the built-in parameters of this remote.
?	View Manual	Opens an online version of the user's manual in a web browser.

Chapter 4

Chapter 4 Reviewer Program

Description

NOTE: Files may also be opened with the optional Vmed Interpreter program if installed. Select the program you wish to open files while not connected to a wireless remote from the PC-Display default configuration option under the "Tools" menu.

The Vmed Reviewer program is included with each Vmed wireless monitoring product and is also available free to any interested person in order to facilitate ECG interpretation by third party consultants. The Reviewer program performs the following functions:

- o Displays the recorded patient files where information recorded from Vmed wireless monitoring products may be stored automatically.
- o Allows archived ECG sweep, patient and episode data to be recalled for review, editing, measurement and printing.
- o Provides for the electronic measurement of ECG complexes.
- o Allows real-time playback of previously recorded ECG sweep data.
- o Makes available, through the Help menu, a table of normal ECG measurements for cats and dogs and guidelines for measuring ECG complexes.
- o Provides an easy method of summarizing and storing ECG measurements, vital signs and diagnostic notes.
- o Provides and easy way of sending email transmission of stored reports.
- o Displays the automatically recorded vital signs measurements.

Modes of Monitor Recording

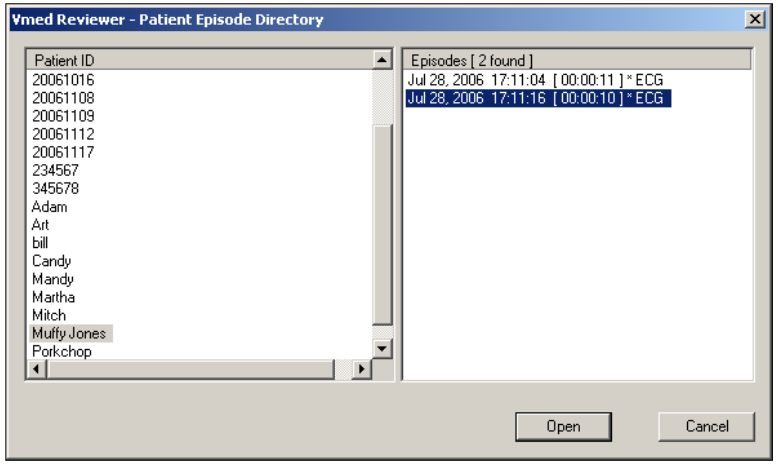
ECG and related data are stored automatically in one of three available modes. Record modes are selected in the PC-Display Configuration window (with Auto Save checked).

1. **Continuous Recording Waveforms; Periodic Vial Signs (typically used in surgery monitoring or in exams)**
   - o Happens automatically upon wireless connection to the remote device.
   - o Records vital signs periodically or upon initiation of an event (Print command, Alarm activation, or Marker event).
   - o Continuous recording of ECG and CO_2 waveforms for the duration of the monitoring session.

2. **Periodic Vital Signs (typically used in surgery monitoring or recovery)**
   - o Happens automatically upon wireless connection to the remote device.
   - o Records vital signs periodically or upon initiation of an event (Print command, Alarm activation, or marker event).
   - o No waveforms recorded.
3. **Manual Recording (Typically used in exam room monitoring)**
   - o Activated with the Record Episode button on the PC-Display toolbar or on the remote keypad.
   - o Will record vital signs only on event as long as "Periodic Vital Signs Only" is selected in the PC-Display default configuration.
   - o Will record vital signs and ECG sweep (as well as CO_2 waveform if enabled) if "Continuous Recording" is selected in the PC-Display default configuration.

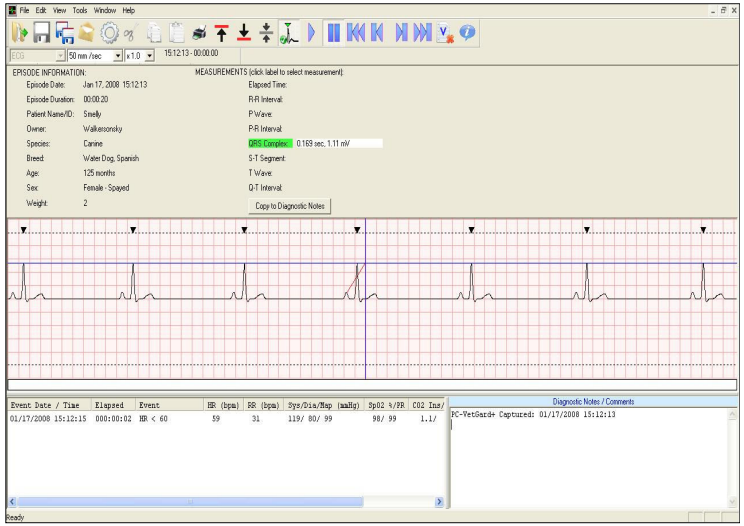
Using the Reviewer Program

1. Double-click the Reviewer icon on the desktop and the Reviewer window will open.
2. Click "`File`" then "Open `Patient Episode…`" on the upper toolbar and the window below will open:



NOTE: If a patient is not pre-identified, patient files are stored numerically by year, month and day. Patient data can be entered prior to, during, or after the monitoring procedure and edited within the Reviewer. Episodes are identified by date and time of the event. When "ECG" follows the episode ID, this indicates that an ECG/CO_2 waveform is present rather than just vital signs.

3. Highlight the patient of interest and then the episode of interest for that patient as shown above and press OK. The next screen will appear:



NOTE: This screen summarizes the patient file for the episode selected along with cursor measurement of the QRS complex. The measurements selected have been dropped into the diagnostics notes and comments box. Note the "red rubber band" vector and the measurement crosshairs above.

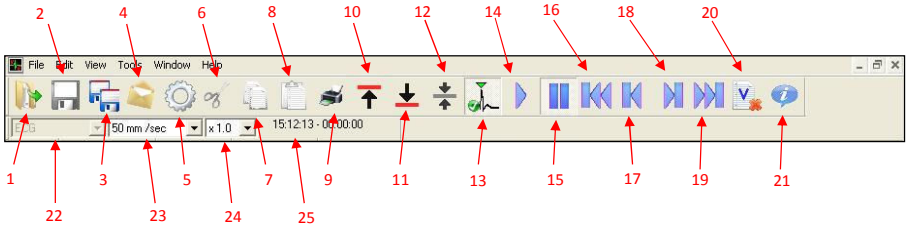
Using the electronic cursor measurement feature

1. First click on the complex you wish to measure in the "Measurements" box at the top of the screen. ***Note: For a description of each complex, click on the "Help" menu in the upper toolbar.***

2. Left click the mouse at the beginning point of your measurement, then drag the mouse to the right and up if amplitude is to be included (you can measure both time and amplitude by measuring at a diagonal). Note the red line stretching from the blue crosshairs in the above illustration. Place the blue crosshair at the end of the interval and the top of the amplitude and release the mouse button. The one step measurement will result in an interval and amplitude calculation if appropriate for that complex. ***NOTE: For best accuracy, increase the gain of the signal before beginning the measurement procedure.***

3. Repeat the procedure in step 2 for each type of measurement.
4. Click the "Copy to Diagnostic Notes" button to drop your measurements into the diagnostics notes section of the report.

Reviewer Toolbar



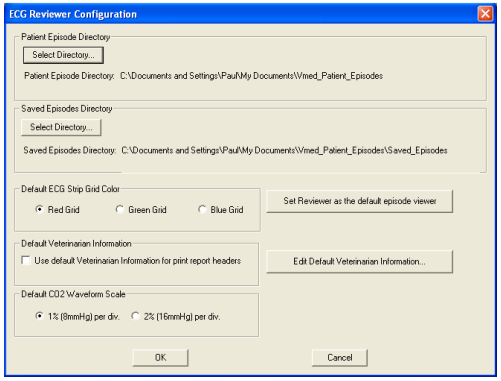
Icon Descriptions

1. Open episode
2. Save episode
3. Save copy of episode
4. Email episode
5. Configure Reviewer
6. Cut
7. Copy
8. Paste
9. Print
10. Shift ECG baseline up 5mm

11. Shift ECG baseline down 5mm
12. Reset baseline
13. View "R" wave markers
14. Play ECG view
    (NOTE: Video controls 14-19 allow you to scroll the entire recorded file to the segment of interest.)
15. Pause ECG view
16. Skip to beginning of ECG trace
17. Skip ECG view backward
18. Skip ECG view forward
19. Skip to end of ECG trace
20. View vitals events only
21. About Reviewer
22. Select waveforms to display
23. Select chart speed
24. Select gain
25. Episode time

Reviewer Configuration

To configure different options within the Reviewer software, click on the "Configure Reviewer" toolbar button or select "Configure Vmed Reviewer…" from the Tools menu. The following window will appear:



Reviewer Configuration Menu Description

- **Patient Episode Directory:** Select the directory where patient files are stored as recorded in PC-Display. This location must be the same as that selected in PC-Display. ***NOTE: Default location is "My Documents".***

- **Saved Episode Directory:** Patient Episode files by default will be saved in this directory when the "Save copy of episode" option is chosen. This can be very helpful if you prefer to frequently save episode copies into the directory of a network computer.

- **Default ECG Strip Grid Color:** You can change the color of the grid on the Reviewer screen. This also changes the color of the print report grid.

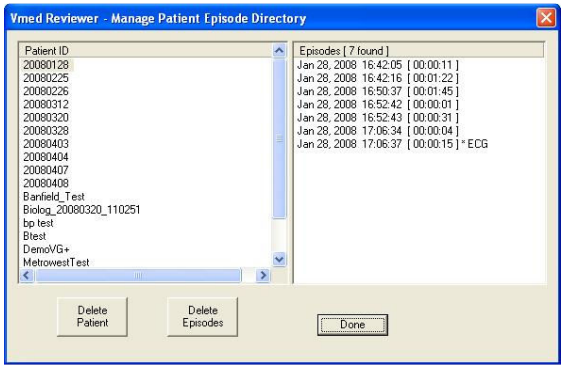
- **Set Reviewer as the default episode viewer:** Allows PC-Display to associate Vmed patient episode files with the Reviewer software (instead of the Interpreter software - only necessary if the Interpreter software is installed and Reviewer is preferred).

- **Default Veterinarian Information:** Used (for printing) the vet clinic information entered here instead of what was recorded with the original episode. Select Edit Default Veterinarian Information to change.

- **Default CO_2 Waveform Scale:** Used for PC-VetGard+ only. Use 2% where capnograph amplitude is large. ***NOTE: Default setting is 1%.***

Manage Patient Episodes Directory

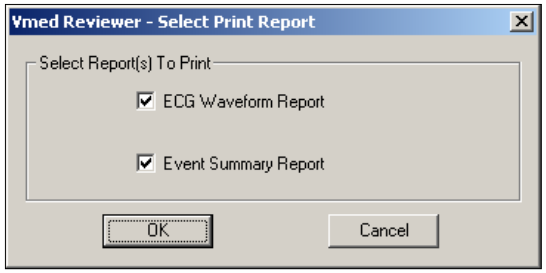
Selecting this option opens the screen below:



The "Manage Patient Episodes" screen allows you to remove unwanted patients and episode files. To delete a patient, highlight the patient and press the "Delete Patient" button. To delete an episode, highlight that episode and press the "Delete Episode" button. ***NOTE: To delete episodes, you must first highlight a patient and then highlight the episodes to be deleted.***

Printing

In order to print an episode either select "Print…" from the File menu or click the printer button on the toolbar. An ECG waveform will print to a single page. The length of ECG waveform depends on the selected sweep speed (i.e., 24 seconds of data at 25 mm/sec, 12 seconds of data at 50 mm/sec, etc.). The following window will open when the print command is initiated allowing you to make your selection:



Below is a sample printout where the first page is the ECG Waveform Report and the second page is the Event Summary Report.

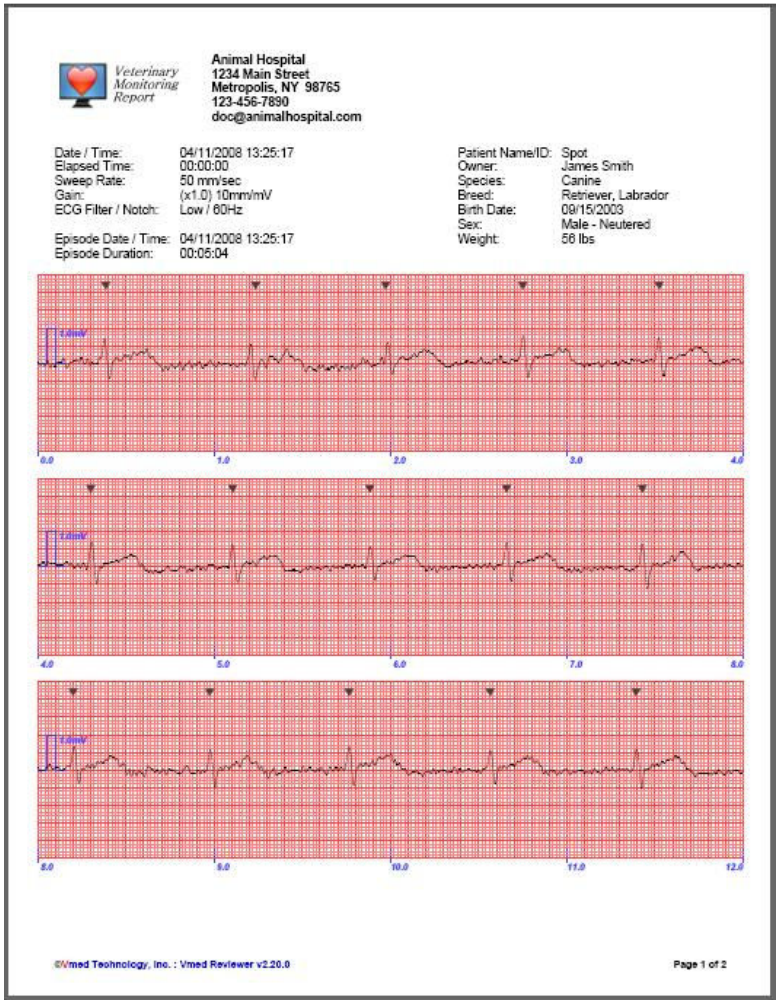
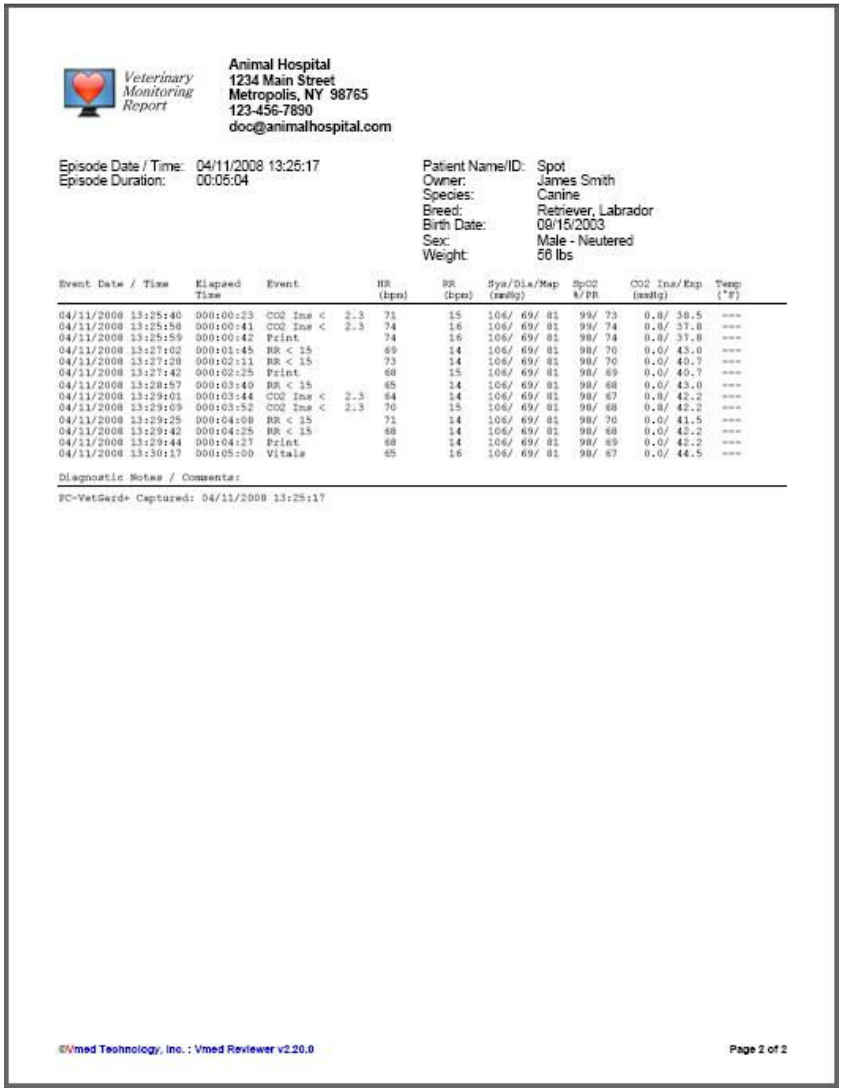


Figure 4 Default ECG Waveform Report includes hospital and patient information followed by twelve seconds of ECG waveform.



Veterinary Monitoring Report

Animal Hospital
1234 Main Street
Metropolis, NY 98765
123-456-7890
doc@animalhospital.com

Episode Date / Time: 04/11/2008 13:25:17
Episode Duration: 00:05:04

Patient Name/ID: Spot
Owner: James Smith
Species: Canine
Breed: Retriever, Labrador
Birth Date: 08/15/2003
Sex: Male - Neutered
Weight: 56 lbs

Event Date / Time	Elapsed Time	Event		HR (bpm)	RR (bpm)	Sys/Dia/Map (mmHg)	SpO2 %/PR	CO2 Ins/Exp (mmHg)	Temp (°F)
04/11/2008 13:25:40	000:00:23	CO2 Ins <	2.3	71	15	106/ 69/ 81	99/ 73	0.8/ 38.5	---
04/11/2008 13:25:58	000:00:41	CO2 Ins <	2.3	74	16	106/ 69/ 81	99/ 74	0.8/ 37.8	---
04/11/2008 13:25:59	000:00:42	Print		74	16	106/ 69/ 81	98/ 74	0.8/ 37.8	---
04/11/2008 13:27:02	000:01:45	RR < 15		69	14	106/ 69/ 81	98/ 70	0.0/ 43.0	---
04/11/2008 13:27:20	000:02:11	RR < 15		73	14	106/ 69/ 81	98/ 70	0.0/ 40.7	---
04/11/2008 13:27:42	000:02:25	Print		68	15	106/ 69/ 81	98/ 69	0.0/ 40.7	---
04/11/2008 13:28:57	000:03:40	RR < 15		65	14	106/ 69/ 81	98/ 68	0.0/ 43.0	---
04/11/2008 13:29:01	000:03:44	CO2 Ins <	2.3	64	14	106/ 69/ 81	98/ 67	0.8/ 42.2	---
04/11/2008 13:29:09	000:03:52	CO2 Ins <	2.3	70	15	106/ 69/ 81	98/ 68	0.8/ 42.2	---
04/11/2008 13:29:25	000:04:08	RR < 15		71	14	106/ 69/ 81	98/ 70	0.0/ 41.5	---
04/11/2008 13:29:42	000:04:25	RR < 15		68	14	106/ 69/ 81	98/ 68	0.0/ 42.2	---
04/11/2008 13:29:44	000:04:27	Print		68	14	106/ 69/ 81	98/ 69	0.0/ 42.2	---
04/11/2008 13:30:17	000:05:00	Vitals		65	16	106/ 69/ 81	98/ 67	0.0/ 44.5	---

Diagnostic Notes / Comments:

PC-VetGard+ Captured: 04/11/2008 13:25:17

©Vmed Technology, Inc. : Vmed Reviewer v2.20.0

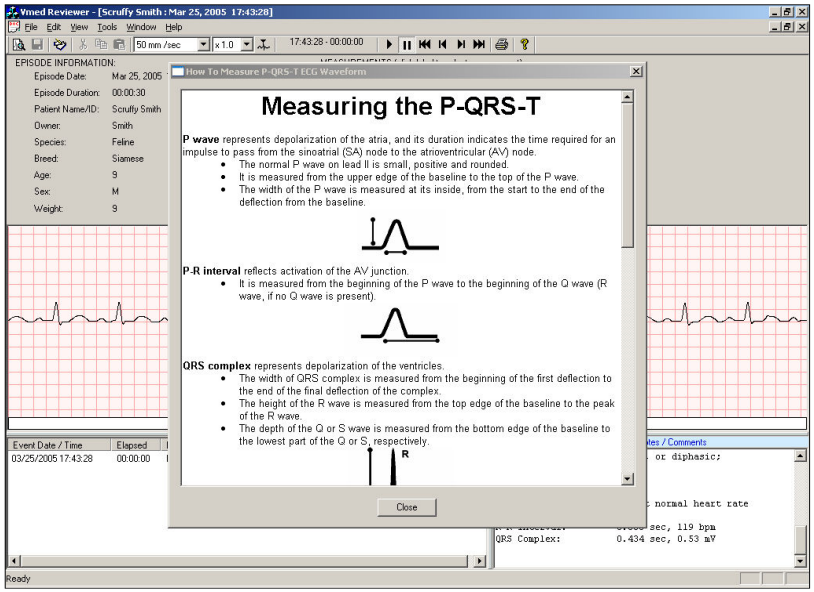
Page 2 of 2

Figure 5 Default Event Summary Report includes vital signs, measurements and clinical comments.

Help Menu

The following selections are available under the "Help" menu:

- Internet Support Website: Hyperlinks to the Vmed service website.
- Background on ECG Waveform Measurements (shown below)


Vmed Reviewer - [Scruffy Smith : Mar 25, 2005 17:43:28]
File Edit View Tools Window Help
How To Measure P-QRS-T ECG Waveform
Measuring the P-QRS-T
P wave represents depolarization of the atria, and its duration indicates the time required for an impulse to pass from the sinoatrial (SA) node to the atrioventricular (AV) node.
The normal P wave on lead II is small, positive and rounded.
It is measured from the upper edge of the baseline to the top of the P wave.
The width of the P wave is measured at its inside, from the start to the end of the deflection from the baseline.
P-R interval reflects activation of the AV junction.
It is measured from the beginning of the P wave to the beginning of the Q wave (R wave, if no Q wave is present).
QRS complex represents depolarization of the ventricles.
The width of QRS complex is measured from the beginning of the first deflection to the end of the final deflection of the complex.
The height of the R wave is measured from the top edge of the baseline to the peak of the R wave.
The depth of the Q or S wave is measured from the bottom edge of the baseline to the lowest part of the Q or S, respectively.
R
Close
Ready

Instructions for measuring ECG complexes from the "Help" menu

- Display Canine ECG Normal Measurements

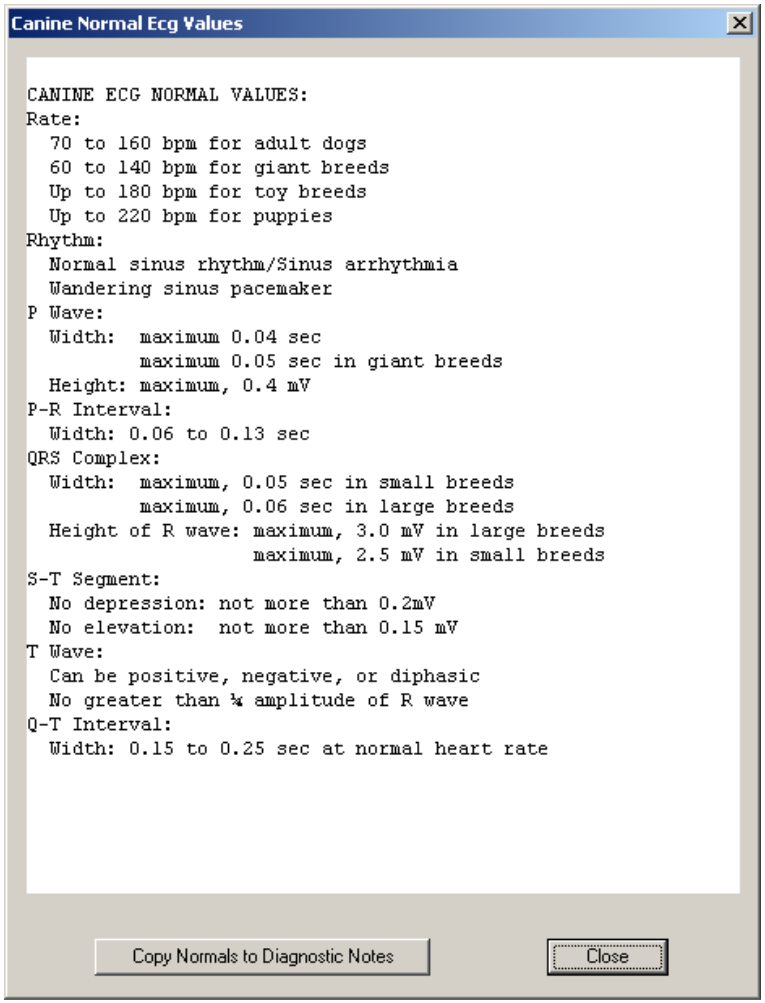

Canine Normal Ecg Values
CANINE ECG NORMAL VALUES:
Rate:
70 to 160 bpm for adult dogs
60 to 140 bpm for giant breeds
Up to 180 bpm for toy breeds
Up to 220 bpm for puppies
Rhythm:
Normal sinus rhythm/Sinus arrhythmia
Wandering sinus pacemaker
P Wave:
Width: maximum 0.04 sec
maximum 0.05 sec in giant breeds
Height: maximum, 0.4 mV
P-R Interval:
Width: 0.06 to 0.13 sec
QRS Complex:
Width: maximum, 0.05 sec in small breeds
maximum, 0.06 sec in large breeds
Height of R wave: maximum, 3.0 mV in large breeds
maximum, 2.5 mV in small breeds
S-T Segment:
No depression: not more than 0.2mV
No elevation: not more than 0.15 mV
T Wave:
Can be positive, negative, or diphasic
No greater than ¼ amplitude of R wave
Q-T Interval:
Width: 0.15 to 0.25 sec at normal heart rate
Copy Normals to Diagnostic Notes
Close

Figure 6 Table of Normal ECG measurements for canine patients from the "Help" menu.

- Display Feline ECG Normal Measurements

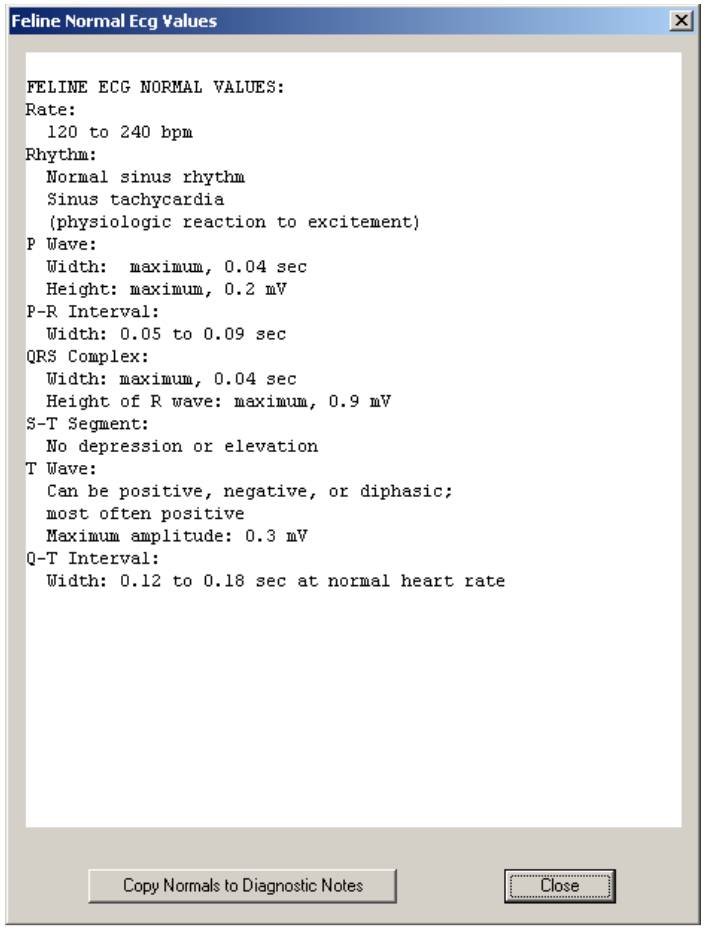


Table of Normal ECG measurements for feline patients from the "Help" menu

Information in Figures 13, 14 and 15 are from *Electrocardiography for the Small Animal Practitioner,* Larry P. Tilley, DVM, DACVIM (Internal Medicine), Naomi L. Burtnick, MT (ASCP). "Made Easy Series", Teton New Media.

Chapter 5

Chapter 5 Support and Troubleshooting

Service and Support

If you purchased directly from Vmed:

Phone: 800-926-9622
FAX: 425-585-0231
Email: info@vmedtech.com
WEB: www.vmedtech.com

If you purchased from DVM Solutions:

Phone: 866-373-9627
FAX: 830-438-7041
WEB: www.dvmsolutions.com

Software Updates

PC-Display can prompt users to check online for software updates if that feature is enabled in the Default Configuration. Access to the Vmed software download site is also available through the help menu on the upper toolbar. Users may also update all software programs by accessing www.vmedtech.com and navigating to "Downloads/Support". There is no charge for software updates unless an install CD is required where there is a $15 charge.

Troubleshooting PC-Display

SITUATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Cannot make Bluetooth connection with computer.	• Weak batteries in wireless device • Improper Bluetooth discovery. • Bluetooth USB adapter not inserted into computer's USB port.	• Check battery status on remote. • Re-initiate discovery procedure. • Verify that USB Bluetooth adapter is plugged into computer. • Determine if the Windows XP Service Pack 2 method of Bluetooth should be used over Bluetooth drivers that came with Bluetooth adapter. (See Chapter 1) • Update PC-Display software
Bluetooth connection has range <50ft.	• Low Batteries. • Signal must pass through high attenuation barrier such as concrete floor/walls or heavy metal objects. • Using built-n Bluetooth adapter with only 10 meter range.	• Check battery status on remote. • Clear signal path. • Disable computer's built-in Bluetooth and use the Bluetooth device provided with wireless product. • Update PC-Display software
Lost wireless connection with computer	• Wireless device out of range of computer or behind signal attenuator. • Wireless device lost power. • Bluetooth device loose in USB port. • Computer turned off or PC-Display closed.	• Move toward computer or clear attenuating obstacle. • Cycle wireless device power switch • Recharge /Replace Batteries • Check Bluetooth device/USB connection. • Restart PC-Display program. • Update PC-Display software
Cannot turn wireless device unit back on.	• Batteries are totally discharged. • User is pressing and holding power button.	• Replace/recharge batteries. • Press and *immediately* release the power button to turn on.

Appendix A

Appendix A Computer Requirements and Specifications

Computer *Minimum* Requirements

Windows XP (Service Pack 2 or 3)

- CPU: 1 GHz. PC desktop, laptop or tablet computer
- MEMORY: 1 GB RAM (for 1-2 concurrent monitoring sessions)
- VIDEO: Minimum 64 MB Graphics Memory
- VIDEO RESOLUTION: 1024 x 768
- Spare USB 1.1 port (for Bluetooth USB adapter, unless computer has built-in Bluetooth)
- CD Rom Drive or Internet Access
- 60 MB available hard disk space for program, plus approximately 100 Kbytes per file stored
- MAPI compliant E-Mail system such as Windows Live Mail, Microsoft Outlook or Outlook Express (for direct email feature of ECG Reviewer/Interpreter software).
- .NET Framework 2.0.

Windows Vista, Windows 7 or Windows 8.1:

- CPU: 1 GHz. PC desktop, laptop or tablet computer
- MEMORY: 1.5 GB (for 1-2 concurrent monitoring sessions)
- VIDEO: 128 MB graphics memory
- VIDEO RESOLUTION: 1024 x 768
- Spare USB 1.1 port (for Bluetooth USB adapter, unless computer has built-in Bluetooth)
- CD Rom Drive or Internet Access
- 60 MB available hard disk space for program, plus approximately 100 Kbytes per file stored
- MAPI compliant E-Mail system such as Windows Live Mail, Microsoft Outlook or Outlook Express (for direct email feature of ECG Reviewer/Interpreter software).
- .NET Framework 2.0.

Both 32-bit and 64-bit versions of Windows Vista, Windows 7 and Windows 8.1 are acceptable.

Appendix B

Appendix B Software License

SOFTWARE LICENSE AGREEMENT

PLEASE READ THIS SOFTWARE LICENSE AGREEMENT CAREFULLY BEFORE DOWNLOADING OR USING THE SOFTWARE.

BY CLICKING ON THE "I AGREE" AND THEN "NEXT >" BUTTONS, OPENING THE PACKAGE, INSTALLING THE PRODUCT, OR USING THE EQUIPMENT THAT CONTAINS THIS PRODUCT, YOU ARE CONSENTING TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CLICK THE "DO NOT AGREE" AND "CANCEL" BUTTONS AND THE INSTALLATION PROCESS WILL NOT CONTINUE, RETURN THE PRODUCT TO THE PLACE OF PURCHASE FOR A FULL REFUND, OR DO NOT INSTALL THE PRODUCT.

EXCEPT AS EXPRESSLY AUTHORIZED ABOVE, CUSTOMER SHALL NOT: COPY, IN WHOLE OR IN PART, SOFTWARE OR DOCUMENTATION; MODIFY THE SOFTWARE; REVERSE COMPILE OR REVERSE ASSEMBLE ALL OR ANY PORTION OF THE SOFTWARE; OR RENT, LEASE, DISTRIBUTE, SELL, OR CREATE DERIVATIVE WORKS OF THE SOFTWARE.

Multiple-Users License Grant: Vmed Technology ("Vmed") and its suppliers grant to Customer ("Customer") a nonexclusive and nontransferable license to use the Vmed software ("Software") in object code form for installation onto a hard disk or other storage device on: (i) an unlimited number of computers in the Customer's facility; or (ii) a single local area network in the Customer's facility for either of the following purposes: (a) for use exclusively with Vmed wireless monitors; or (b) use of the Software by consultants and contractors of the Customer for purposes of aiding the customer in the interpretation of clinical information in patient files transferred by the Customer to said consultants or contractors for the purpose of aiding in medical diagnosis. Customer may only use the programs contained in the Software (i) in accordance with paragraph (a) above; or in the case of an evaluation or demonstration copies, those programs Customer is authorized to evaluate.

EXCEPT AS EXPRESSLY AUTHORIZED ABOVE, CUSTOMER SHALL NOT: COPY, IN WHOLE OR IN PART, SOFTWARE OR DOCUMENTATION; MODIFY THE SOFTWARE; REVERSE COMPILE OR REVERSE ASSEMBLE ALL OR ANY PORTION OF THE SOFTWARE; OR RENT, LEASE, DISTRIBUTE, SELL, OR CREATE DERIVATIVE WORKS OF THE SOFTWARE.

Customer agrees that aspects of the licensed materials, including the specific design and structure of individual programs, constitute trade secrets and/or copyrighted material of Vmed. Customer agrees not to disclose, provide, or otherwise make available such trade secrets or copyrighted material in any form to any third party without the prior written consent of Vmed. Customer agrees to implement reasonable security measures to protect such trade secrets and copyrighted material. Title to Software and documentation shall remain solely with Vmed.

LIMITED WARRANTY. Vmed warrants that for a period of ninety (90) days from the date of shipment from Vmed or its distributor: (i) the media on which the Software is furnished will be free of defects in materials and workmanship under normal use; and (ii) the Software substantially conforms to its published specifications. Except for the foregoing, the Software is provided AS IS. This limited warranty extends only to Customer as the original licensee. Customer's exclusive remedy and the entire liability of Vmed and its suppliers under this limited warranty will be, at Vmed or its service center's option, repair, replacement, or refund of the Software if reported (or, upon request, returned) to the party supplying the Software to Customer. In no event does Vmed warrant that the Software is error free or that Customer will be able to operate the Software without problems or interruptions.

This warranty does not apply if the software (a) has been altered, except by Vmed, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Vmed, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident, or (d) is used in hazardous activities.

DISCLAIMER. EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW.

IN NO EVENT WILL VMED OR ITS SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THE SOFTWARE EVEN IF VMED OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event shall Vmed's or its suppliers' liability to Customer, whether in contract, tort (including negligence), or otherwise, exceed the price paid by Customer of the Software or wireless monitors. The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. SOME STATES DO NOT ALLOW LIMITATION OR EXCLUSION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES.

The above warranty DOES NOT apply to any beta software, any software made available for testing or demonstration purposes or any temporary software modules. All such software products are provided AS IS without any warranty whatsoever.

This License is effective until terminated. Customer may terminate this License at any time by destroying all copies of Software including any documentation. This License will terminate immediately without notice from Vmed if Customer fails to comply with any provision of this License. Upon termination, Customer must destroy all copies of Software.

Software, including technical data, is subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Customer agrees to comply strictly with all such regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import Software.

This License shall be governed by and construed in accordance with the laws of the State of Washington, United States of America, as if performed wholly within the state and without giving effect to the principles of conflict of law. If any portion hereof is found to be void or unenforceable, the remaining provisions of this License shall remain in full force and effect. This License constitutes the entire License between the parties with respect to the use of the Software.

Appendix C

Appendix C Discontinued Monitors

Vmed has discontinued two monitors but still supports both. The PC-Vet ECG monitor and the PC-VetGard(I) ECG/SpO_2 monitor are no longer manufactured. Later versions of the PC-Vet ECG monitor are compatible with PC-Display, however earlier versions may require the original application software called "PC-Vet" which has fewer capabilities. Owners of the PC-Vet can return the device to Vmed to be updated and made compatible with PC-Display. The original PC-Vet software can be downloaded from www.vmedtech.com (you may need to contact customer support for assistance). The original VetGard is fully compatible with PC-Display.

For questions regarding compatibility, telephone Vmed customer support at 800-296-7763.

PC-Vet

PC-VetGard (I)

PC-Display Wireless Monitoring Software

© Vmed Technology
914 164th Street SE
Mill Creek, WA 98012
Phone 800-926-9622 · Fax 425-585-0231
info@vmedtech.com
www.vmedtech.com